American Machinist

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German Machinery

IN EUROPEAN MARKETS

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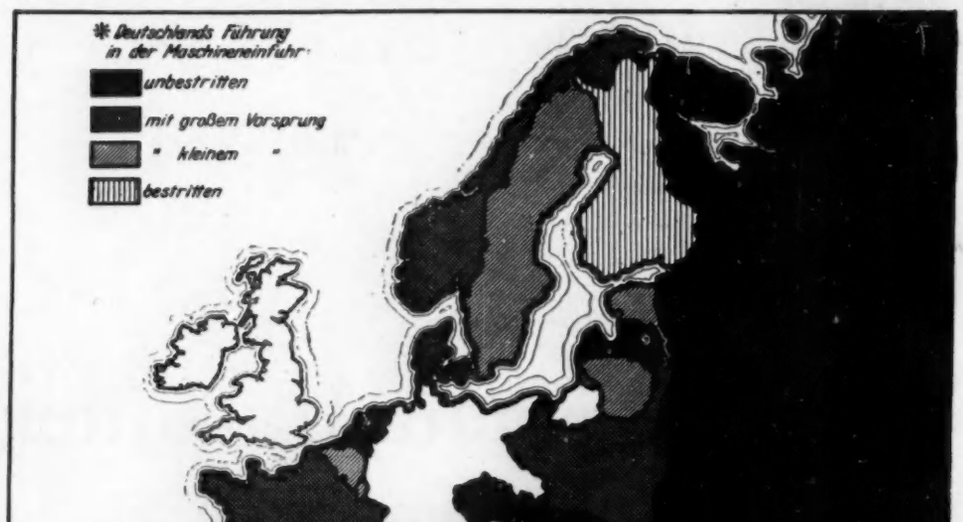
SOMETIMES an opinion concerning facts is just as important as the facts themselves. Here is reported one opinion of the German position in European machinery markets.

DESPITE the fact that export trade in general has declined about 20 per cent, shipments of machinery from this country have increased about 4 per cent. This increase is the more gratifying when it is remembered that machinery exports from both Great Britain and Germany have declined. Special studies, covering the trade in machine tools, in mining machinery, and in construction equipment, show astounding progress, particularly in certain directions.

But gratifying as all this may be, there still remains occasion for both continued effort and further study of the situation. Several American machinery manufacturers who visited the Leipzig Fair this Spring have now returned, reporting that German machinery manufacturers are making unusually rapid progress in the design and building of new equipment. In earlier years American manufacturers might have watched German efforts with complacency. They felt their own superiority in materials, in design, in speed of operation, in fact along the whole line of technical development; but the more recent German machines indicated that the industry there is making a determined effort to attain the very highest standards to be found in the world's markets. And this is true not only in a technical sense but in a certain artistic sense; for in the newer designs there is a certain nicety of line and a general finish that suggest thoroughly and adequately developed designs. Furthermore, for some years great efforts have been made in Germany to standardize design details, which are an undoubted improvement. These standardized parts are now to be found incorporated in the newer designs. Unquestionably a situation is in the making which should be most carefully watched by American manufacturers who have enjoyed a substantial export business.

Also, in spite of all that has been heard in this country recently regarding distressing economic conditions in Germany, it appears that they also boast a little bit. Recently there was published the accompanying map describing the position of the German machinery industry in the markets of Europe. In the black areas they claim the market is *unbestritten* (uncontested), and it will be observed that this represents 50 per cent of the area of Europe. While there may be individuals who would be disposed to argue that these markets were not in reality uncontested, this map at least suggests that there are areas that are perhaps not receiving adequate attention from American export interests. From the American point of view Germany, of course, would be included with these black areas, for those who produced this map undoubtedly looked upon Germany as a domestic market well controlled in the interests of the manu-

Die deutsche Maschinenindustrie auf den europäischen Märkten



***Germany's Leadership in European Machinery Imports. The four legends mean, in order from top to bottom: uncontested; with great advantage; with small advantage; contested**

facturers of that country.

In the above the word uncontested has been interpreted to mean that Germany has supplied over 50 per cent of the machinery imported into a given country. Other countries covered with double cross-hatching are described in the German publication as territories where German manufacturers operate "with great advantage," by which they mean that Germany may furnish less than 50 per cent of the total machinery imports of the country, but nevertheless German shipments are at least double those of any other outside competing country. Again the map suggests that American manufacturers have not perhaps exercised adequate sales efforts in such countries as France, Italy, Austria, Czechoslovakia, and Norway.

The group of countries covered with single cross-hatching are described as those where Germany operates "with small advantage," by which they mean to claim that Germany has a volume some 50 per cent greater than the nearest competing importing country. Evidently on this reduced standard it would appear that American interests should devote greater attention to the markets of Spain, Belgium, Sweden, and the several Baltic countries.

Only the countries with vertical ruling are, from this German point of view, areas where the market "is contested." Portugal, Finland, and Greece are the only areas acknowledged to be competitive in the sense that German shipments are only slightly greater than those of the nearest competitor.

WHEN the situation in Europe is presented in this way, it would seem that the German point of view should cause American machinery exporters "furiously to think." Obviously those who prepared this map disregarded British territory; but otherwise we have here a very clear statement. Though more American machinery goes to Europe than to any other distant continent, it would seem that American sales efforts in the markets of Europe must still be less adequate than export statistics would indicate.

Standard Arbitration Clauses

PROPERLY prepared arbitration clauses are now valid, irrevocable, and enforceable under the arbitration laws of the States of New York, New Jersey, Pennsylvania, Massachusetts, California, Louisiana, Connecticut, Rhode Island, New Hampshire, and Arizona, and under the Federal Arbitration Law. The use of clauses in contracts, enforceable under these laws, is practical insurance against involved litigation.

The American Arbitration Association has prepared the following standard clause which contains the essential legal requirements: "Any controversy or claim arising out of or relating to this contract or the breach thereof, shall be settled by arbitration, in accordance with the Rules then obtaining, of the American Arbitration Association, and judgment upon the award rendered may be entered in the highest court of the forum, state or federal, having jurisdiction." There is also a similar standard arbitration clause for use in foreign trade contracts.

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Finish and Trim of FORD BODIES

HERBERT CHASE
Associate Editor

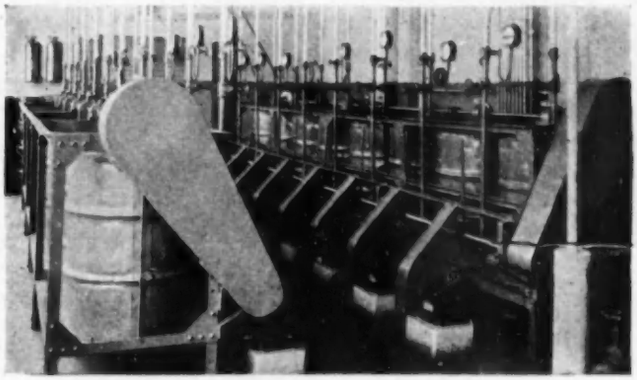
IN COMMON with all other operations, painting and trimming of bodies must follow a fixed schedule in Ford assembly plants. Otherwise congestion and delays would handicap assembly and disturb the regular flow of parts and materials from their receipt to the delivery of complete cars at the end of the final assembly line. Consequently every operation is standardized and timed to produce uniform results on a fixed schedule.

All unfinished bodies leaving the body assembly line, described in a prior article, are hung upon a chain conveyor which doubles back parallel to the body assembly line and to the incoming freight siding and makes several other turns as it traverses various parts of the shop during the painting operations. Whenever natural light is inadequate, illumination is provided by mercury vapor light, tungsten filament bulbs, or a combination of these two types of light source. All coats except the primer, which is an oxidizing oil containing some pigment, are pyroxylin-base lacquer finishes.

The color sequence followed in painting depends upon dealer demand. A few days before his quota is due him on any date, each dealer specifies the standard color combination he desires on each type of car he will receive. This information is compiled and worked into the production schedule for the day, and the finishing department, as each body comes along, spray-paints it with the color specified on the production sheet.

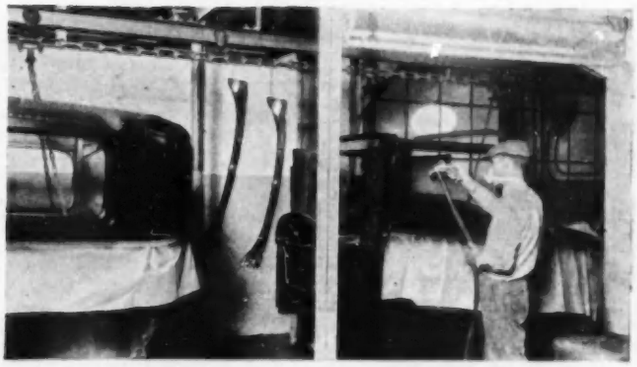
A circulating system is employed to supply the lacquer through pipe lines to the various spray booths from central mixing tanks. Compressed air is piped from the power house to all such points and a small steam line is piped through the air lines near the booths to assure dry air at the spray nozzle. Colors come ready-mixed and arrive at the central distribution point in cans or drums. For each color there is a separate storage tank, pump, and pipe line leading to all spray booths. An agitator in each tank keeps the lacquer stirred up and prevents pigment from settling out. The attendant fills each tank to the correct level and sees that the pumps are kept in operation. Even when the spray outlets on any line are not in use, it is necessary to keep the paint in circulation to maintain a uniform mixture, and so that the lacquer will not settle or harden in the pipe. Lacquer not used at the spray booths flows back through the return lines to the storage tanks. These return lines discharge at a level above the tops of the tanks so that the attendant can watch the flow at all times and make sure that the line is available for service.

All finishing materials are supplied under rigid specifi-



Agitator tanks from which lacquer is pumped to the spray booths and kept in constant circulation by the pumps shown

Final water-sanding is done on bodies as they pass along the conveyor at the right and some polishing operations as they return on the conveyor at the left. Incandescent and mercury vapor lights placed alternately furnish plenty of illumination



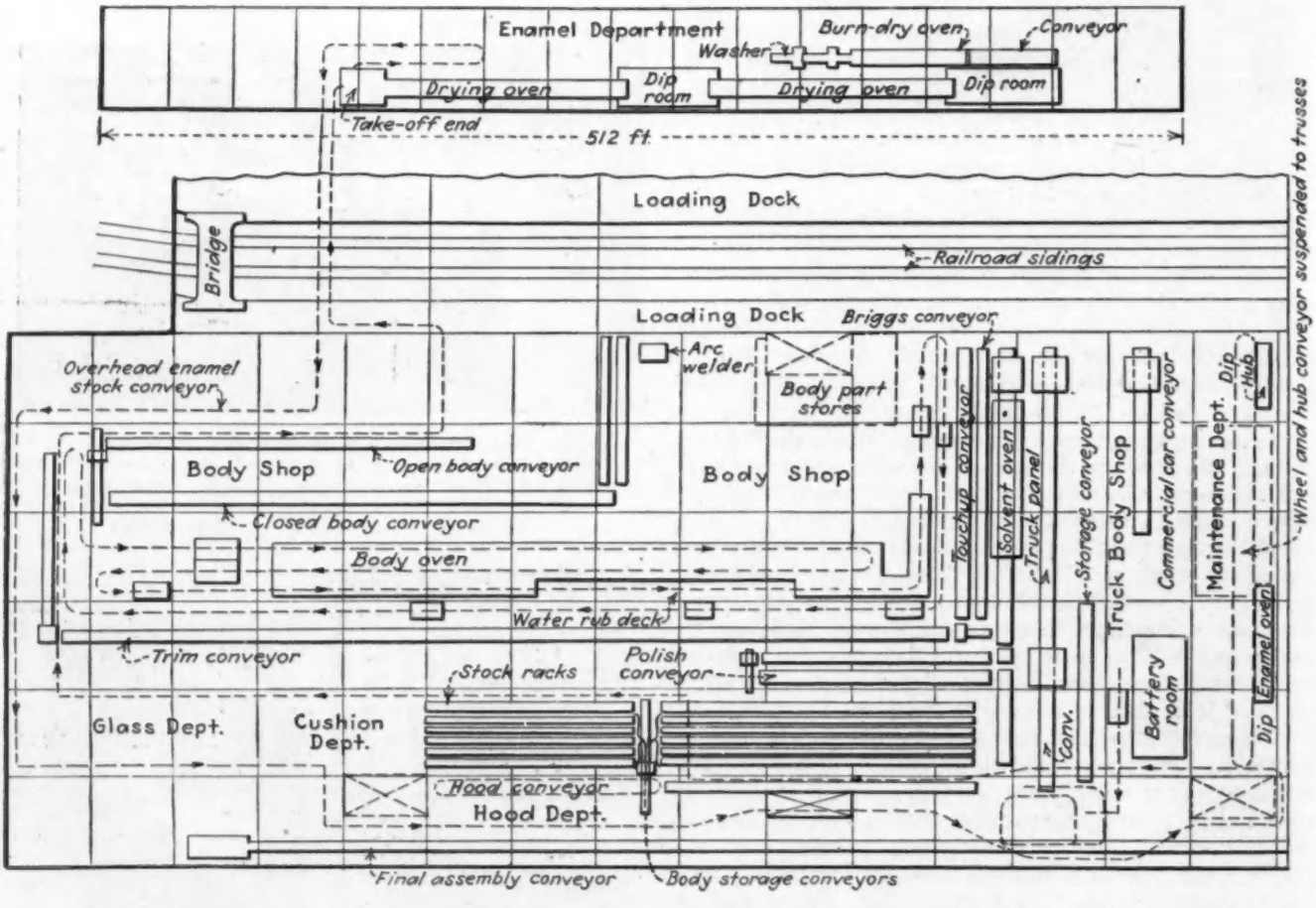
One of the spray-painting operations after masking lower portions of bodies. All spraying is done inside of clean, well-ventilated, glass-inclosed booths as the bodies pass along the chain conveyor

Trimming is done as the bodies travel along this conveyor, some men working inside and some outside the body. Kits of upholstery parts, ready for tacking in place, are fed in from bays at the left where some of these sub-assemblies are prepared

cations and samples from each shipment are carefully tested to see that standards are maintained. This makes mixing and matching paints at the assembly plant unnecessary and assures uniform results at all times.

Before finishing operations start, an air jet is used to remove all dust from the bodies, and they are washed with a mixture of alcohol, ammonia, and water to remove any remaining traces of oil and grease. Following this operation they are rubbed with a tack-rag and then enter the first spray booth where they are sprayed with a coat of brown primer inside and outside. The bodies next enter an oven through which they travel slowly for 2½ hours in a temperature of 225 to 250 deg. F. supplied by steam heat. Some loose parts, a certain number of which are intended for service stock, are hung upon the body conveyors and receive the same treatment and finishing given to the bodies themselves.

A scuffing or dry sanding operation of the primer coat with a 6-0 paper follows the baking. A pyroxylin filler coat is next applied and the bodies are allowed to air dry for a few minutes. This coat then is mossed over with dry 6-0 paper, the dust is wiped off, and a second coat of pyroxylin surfacer is sprayed on, after which the bodies pass through a 150-ft. steam-heated drying oven. As they issue from this oven they are cooled with a water spray and then are water sanded. Each workman has



Layout of conveyor system in portions of the Ford Chester plant where finishing and body operations are performed. Fabricated parts are unloaded into racks at the railway siding docks or are carried, either by conveyors or by trucks, to the point where finishing or assembly operations begin. All conveyors feed parts or subassemblies toward the final assembly line with minimum handling. Chain and slot conveyors are used.

to rub one panel or section of surface and is held responsible by the foreman and inspectors for doing a thorough job. The body is washed clean, blown dry and inspected for bare and rough spots and sags. Any bare spots are primed with a touchup gun and any low spots are glazed.

Bodies then go through an oven 115 ft. long and heated to 160 deg. F. by steam to dry out all moisture, after which they are wiped with a tack-rag. A double-header coat of pyroxylin lacquer, that is two coats, one with the spray gun moving in horizontal stroke and a second with the gun moving vertically, are applied and allowed to air-dry for 20 min. A second double coat of lacquer then is sprayed on. Another short drying follows. The third and final double-header coat of colored lacquer then is applied to the main portions of the body.

Masking tape and paper are then affixed to protect the main body while moldings and window reveals are sprayed with another shade or color. These parts are given a double-header coat, air-dryed 20 min., and again sprayed with a double coat. This completes the major finishing coats except for the application of a clear coat of pyroxylin after a final sanding.

As soon as the upper body dries the masking is removed and certain further assembly operations, such as installation of floor board, window regulators, and anti-rattlers, are performed. Bodies then are lowered from the chain conveyor onto a roller-top turntable and are transferred to a short slat conveyor where the wire mesh covering is nailed to the roof rails, head linings are installed, and some additional small parts and hardware items are fastened in place. Bodies then are transferred to the main trim line. Sub-assemblies of instrument panels are made on benches adjacent to the point of application.

Trim operations include attachment of interior door panel assemblies, made on adjacent benches; application of the fabric-leather roof deck and moldings; the tacking in place of various trim subassemblies; and the fitting of curtains and tops to open models. The instrument panel, glass channels, glass rear window, windshield, garnish rails and cushions also are put in place. Some of

Sanding operations are performed between applications of the lacquer coats, and the bodies are blown off and carefully dried before additional coats are applied

the frames and metal strips used in these units are lacquered in sub-assembly lines or on benches adjacent to the trim conveyor, and are fed into the latter at points where they are required. In general, these parts receive the same number and character of coats as are applied to the body itself. Much of the same applies also to the hood, which is not added, of course, until after the body is assembled on the chassis.

As soon as the trimming operations are completed, the body, continuing on the same slat conveyor, receives its final sanding. Again each man has one particular section or panel to finish. After rubbing a strip he wipes it clean with a strip of rubber so that he can see whether or not the surface is smooth. Water is supplied in troughs that run beside the conveyor. As soon as rubbing is complete, the body is wiped clean, blown dry, and transferred to a transverse conveyor, where touching up is done. The body then enters the final spray booth, where a solvent coat of thin clear lacquer is sprayed on to bring out the luster and eliminate scratches.

Final drying is done in a 75-ft. oven steam heated to

Some of the polishing is done with portable electrically-driven wheels such as that shown

Hand-cleaning and sanding of fenders and other parts to be enameled is done on this bench, after which the parts are carried on a slat conveyor through the washer seen in the background

After washing and a short baking to evaporate all moisture and burn out any traces of grease, the parts are tack-ragged and passed into the glass enclosure shown. There they are hung upon a bar conveyor to be carried through the enameling tanks and drying ovens

110 deg. F., after which the bodies are removed to a polishing line. Here a plastic polishing compound is rubbed on the body, which then is polished with clean rags. A lamb's wool buffing wheel driven by a flexible shaft is used for the final polishing operation. An aluminum drip rail is then tacked in place, all windows are cleaned, and edges that have been rubbed through are touched up. Striping then is done with pyroxylin colors by workmen who have been carefully trained in the use of striping brushes.

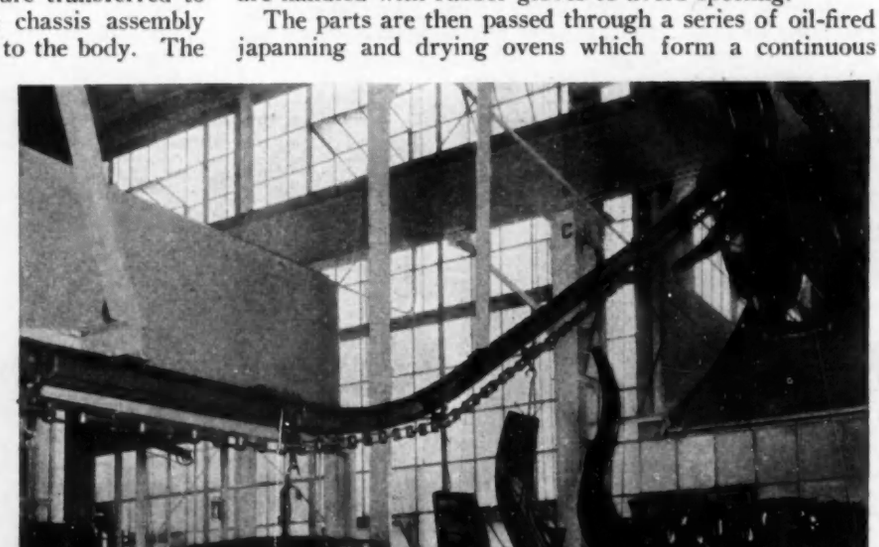
All bodies then are transferred to six roller conveyor lines for temporary storage adjacent to the point where they are shifted to the chassis line for assembly on the chassis. The storage system holds about 235 bodies, that is, the output of one shift. Twenty-four hours from the time a body assembly is started, the car has been compled and delivered to the dealer.

After a final inspection the bodies are transferred to another conveyor line leading to the chassis assembly line where rear fenders are assembled to the body. The daily production sheet lists each individual car to be produced, in the order that it is to come off the line, and the bodies are removed from the storage lines and placed on the line leading direct to the chassis assembly line in this exact order. On this conveyor line, which is narrower than the width of the bodies, the two steel skids are removed from each body and sent back to the body assembly line. As the chassis move down the assembly line the bodies are picked up by electric hoists running on an overhead I-beam track that forms an endless loop system leading above both the body conveyor and the final car assembly conveyor lines. These hoists pick up the bodies and lower them onto the chassis.

Fenders, both front and rear, splash guards and several other parts are finished with black japan. This is an oxidizing oil finish, an entirely different product from the lacquer used on the body, and is designed for baking at relatively high temperatures. Consequently the parts to be enameled travel through a circuit entirely separate and distinct from that through which the body is routed. These parts arrive at the plant in box cars and those intended for domestic use are unloaded into racks from which they are shifted, as required, onto a chain conveyor leading to the enameling department which is located in another building.

There all parts are placed on a slat-conveyor and hand-sanded to remove rust. Any dents in the sheet metal parts are bumped out with hand tools and any scratches or high spots are removed with a grinding wheel. The parts then continue on the conveyor through a washer where they are cleaned by means of jets of hot water at about 210 deg. F. From the washer parts enter an oil-fired burn-off oven which they pass in about 6 min. under a temperature of from 650 to 800 deg. F. In this oven any grease that may remain in the crevices is burned off. The cooling of parts issuing from the oven is aided by a draft of air from a slotted pipe mounted over the conveyor. When cool enough to handle with gloves, the parts are tack-ragged and passed to the enameling oven. This work is done within a glass enclosure where an outwardly flowing current of clean air, supplied by a blower, is maintained to keep out all dust, which would cause spots in the enameling. The tack rag, which is a square of cheesecloth dipped in varnish, takes up any lint remaining on the parts. During all these operations, and until they come from the enameling ovens and are sent to assembly departments, the parts are handled with rubber gloves to avoid spotting.

The parts are then passed through a series of oil-fired japanning and drying ovens which form a continuous



Upon leaving the drying ovens, enameled parts are hung upon the 2,800-ft. chain conveyor here shown and are carried by it to the points where they are assembled to chassis and body

system 370 ft. long, traversed throughout its entire length by a bar conveyor. The bars are about 7 ft. long and are spaced 24 in. apart. The chains travel about 28 in. per minute. Small parts are hung close on every bar, but large parts such as fenders are hung on alternate bars, to prevent them from touching during the enameling process. From ten to twelve fenders are put on each alternate bar. Oil-fired oven heaters arranged in two batteries supply the necessary heat to the ovens.

Parts first pass through a tank of what is known as No. 101 japan, black in color, and then drain over drip-pans from which excess enamel is pumped back into the dipping tank. Every 24 hours the enamel (or japan) is pumped out, strained, and clarified, the tank is cleaned, and the enamel is put back. It is tested 12 times every 24 hours for gravity, viscosity, and temperature. It requires about one hour for parts to pass through this oven, which is kept at a temperature of 250 deg. F. at the beginning, 475 deg. F. at the center, and 350 deg. F. at the end. Recording pyrometers register and regulate the temperature. The air heated is drawn in through filters, passed through the heating elements, which are cleaned twice weekly, and finally through air ducts into the oven. Fuel is piped from a central supply system.

Wire wheels are dipped in the enamel tank shown, then are spun to throw off excess enamel, finally are hung upon the bar conveyor which carries them through the baking oven

The parts cool down in another section of the system, and then go into a second tank of No. 102 jet black japan for the finishing coat. A special cooling system is used to circulate the japan and keep its temperature low. This japan also is clarified every 24 hours and is inspected 12 times in 24 hours for gravity, viscosity, and temperature. The parts, after draining, are passed through the second drying oven where the maximum temperature is held at 450 deg. F. by eight heating units. The japanning and baking oven conveyor is composed of chain links driven at three separate points by synchronous motors, operated as one unit by a special cam device developed for the purpose by the Ford company. Slack is taken up on the chain by an idler shaft on which counterweights are hung, 16 weights of 60 lb. each, or 960 lb. total, being a normal amount. From 540,000 to 775,000 lb. of parts, chiefly of sheet steel, are enameled per day in the system.

As the parts come from the last oven of the system they are still warm. They are inspected individually and are hung upon hooks on an overhead chain conveyor system, over 2,800 ft. long, feeding the chassis and final assembly lines. These departments are in another building, into which the conveyor goes through an overhead covered bridge. At the feeding point of this conveyor, which is the discharge end of the enameling conveyor, the day's supply of larger parts, such as fenders and running-board splash plates, is stored. The quantity of stock is kept low, for storing is expensive and parts like fenders must have protecting pads placed between them, which is a costly operation. If they bump or touch they are marred and must be straightened and perhaps re-enameled.

Many chassis parts, consisting mainly of forgings, go through the enameling cycle the same as fenders and other sheet metal parts. They all are cleaned, washed, dried, and, if rusty or greasy, are sanded. The remainder of the procedure is identical with that for fenders.

Wheels are enameled by mounting them individually on the spindle of a special machine and submerging them in the enamel by operating a lever on the machine. By reversing the lever the wheel is lifted out of the enamel. The wheel is then spun to throw off the excess coating. When taken from the machine the wheels are hung from the bars of a separate oil-fired drying oven in which a temperature of about 350 deg. F. is maintained. The time of travel through the oven is about 2 hours and 20 minutes.

WHEEL hubs are enameled on a second spinning machine, a cover plate fitting over the inside portion to keep the japan out. After dipping and spinning, the hubs are hung upon the conveyor with the wheels and undergo the same drying operation.

When they come from the drying oven the hubs are delivered to the chassis assembly line, while the wheels go to a station close to the final car-assembly line, where tires and tubes are fitted and inflated. An average of about 2,500 wheels per day are turned out for the assembly, export and service requirements of this plant.

Parts for service stock are processed through japanning operations in the regular production line. The packing division of the service department is traversed by the overhead chain conveyor leading from the japanning department to the assembly lines. Parts required for service are removed from the conveyor and packed for shipment. If the service department removes material that the production line may need later, it can be replaced readily on the line so that assembly operations, which are the more important, may go on without interruption.

In a later article the operations performed in assembling the Ford chassis and mounting the body upon it will be described and illustrated.

EXECUTIVE FORUM

Can Ideas Be Allocated?

THE plant lunchroom of the Eastside Machine Company functioned as a clearing house as well as a filling station. The interval between soup and coffee was effectively utilized by executives, major and minor, in clearing up many a troublesome manufacturing problem.

Paul Gilmore, Eastside's chief engineer, selected a chair beside the comptroller, Ben Coleman. "I'm not so sure this new cost system is going to work out in the engineering department," he said, at once plunging into the subject nearest his thoughts. "When you sold the plan at the conference the other morning, it sounded logical enough, but I find an unfavorable reaction already. I don't think you can put engineering on the same basis as the production departments."

"But isn't it a production department?" asked Coleman.

"Strictly speaking, I consider it one of the most important of them, but I meant to say you can't handle men who work with their minds the same as those who work with their hands. Specifically, the men in my department object to punching a time clock and ringing in and out on each job."

"Well I rather expected that," said Coleman. "They are not so used to it as the men in the shop."

"It goes deeper than that," claimed Gilmore. "A man breeding ideas cannot work against time. In fact, it is detrimental to his results if he attempts to do so."

"I am afraid your engineers have missed the point of this move. We are not trying to get them to squeeze out more ideas per day. But since you agree that the engineering department is productive, it is essential to allocate its cost against the product. The time clock simply affords the easiest means of doing this."

"But much of our effort does not apply to work in process," objected Gilmore. "I can see how you can charge jig and fixture design against a particular order on which it is used. But how about estimates, proposals, and development work which may or may not materialize in manufacture?"

"As much as possible is apportioned, and the rest goes into engineering overhead which includes the plant space occupied, blueprinting, drawing materials, and traveling expenses, as well as the engineering time which cannot be charged to a manufacturing order. Development costs are kept segregated until it is determined whether or not the results will be utilized. When used, they are eventually absorbed by a particular product. If all engineering expenses are thrown into general shop overhead, the burden is overstated and incorrect costs result. Besides it will interest the management to know how much expense is going into channels that yield no results."

"Not being an accountant, I cannot refute your views on costs," said Gilmore. "I do know, however, that the time clock system is causing uneasiness."

"Any other method you may propose to secure the same results will be acceptable," said Coleman. "I think, though, that you will find the men who object to punching the clock are those who watch it most closely."

Topic suggested by Thomas B. Frank, Treasurer, Cincinnati Planer Company

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What Do You Think About This Executive Problem?

Can engineering costs be treated as other manufacturing costs in the method of charging them against the product? If so, what is the best method of collecting and distributing these charges? Some executives can see no distinction between the engineering and other productive departments. Others feel that some spontaneity of effort is lost when design is placed on a factory basis.

Have you had experience with engineering costs which would throw some light on this subject? If so send your ideas to *American Machinist*.

. . . Discussion

of Executive Problems

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Does Reciprocity Pay?

Reciprocity is an expression of the principle that one good turn deserves another in return. In business it takes many forms, the most common being the service and attention given to regular customers for continued receipt of orders. The buyer may not be able to do better elsewhere, but the seller does not know this and so feels somewhat indebted to his customer.

A case of this kind recently came to my attention. The production manager was accused by one or two other officials of showing partiality in getting out the work of a given customer at the expense of others. They were asked by the works manager if the firm could afford to do otherwise with that customer. This put a good light on the situation and the production manager's policy was continued and considered as good business.

Reciprocity should be used only as an aid to business. By using it with care better service and deliveries can be expected, and often prices are adjusted to allow for a favorable decision in placing a good order. When properly handled the advantages to both sides outweigh the disadvantages. —L. F. SWENSON, *Industrial Engineer, Perkins Machine & Gear Company.*

Jigs By Whom?

Because tooling facilities and machining possibilities influence design of a product, it is difficult to separate the engineering department's interest in jig and fixture design. Nor is it advisable to do so.

In an auto body plant it simply cannot be done. A new model means the creation of hundreds of press shop, welding, trip-hammering, inspection, and assembly jigs and fixtures. These have to be drawn up and made before the dies are ready to produce stampings. They are usually started before the customer knows finally what he wants. The magnitude of the task bars it from being loaded on the shoulders of the shop management. The problem is most satisfactorily solved by giving the works department at least one or more jig designers of their own. These men specialize on problems that cannot be foreseen and do experimental work, leaving the bulk of the heavy designing to the engineering department, but keeping in touch with it as it progresses. Being closer to the shop viewpoint, they can help to iron out differences regarding radical engineering designs before they are carried too far. The shop knows what is coming, and meets it in a better frame of mind than if it knew nothing until the tools were dumped on the floor.

—JAMES K. MATTER, *Supervisor Press Shop, E. G. Budd Manufacturing Company.*

Is Incentive Necessary?

I have yet to see or hear of any line of manufacturing endeavor that has not benefited greatly by an incentive system. If employers would only look around, they would see that these so-called failures and weaknesses are not the fault of the system but the fault of the men who have the direction of the system.

It seems to be the mistaken idea in the minds of employers, that the installation of an incentive system involves an enormous expenditure. Watch the men on a fixed hourly rate, that have just been given an increase in pay; they will produce more work for a while and then slow down. Why not have the incentive operative all of the time, and keep the production up, consistent with the quality. The biggest black eye that systems receive are by plants that spend a lot of money for industrial engineers, and as soon as these men are done the employer puts a local man in charge regardless of his ability, with the result that the original methods are thrown to one side.

At this plant our product is widely varied, mostly being orders to customers specifications; yet with this continual change going on all the time, we have a good incentive system operating, and approximately 75% of the employees on piece work. Incidentally the cost of maintaining this system is unbelievably low and will compare favorably with the costs of maintaining records in day work shops.

—CHARLES R. WHITEHOUSE, *Chief Time Study, The Holtzer-Cabot Electric Company.*

What Price Titles?

Here is another example of high sounding titles. A few months ago, we were working in the laboratories of a large corporation on an experimental job and were expecting a batch of gear blanks from a division situated about 100 miles from Detroit to be sent to us by truck, special delivery. Finally the truck appeared and I rushed to my friend.

"Walter," said I, "your truck driver is here and is looking for you."

"Truck driver?" said he. "Why, he is no truck driver; he is our assistant superintendent of transportation."

Upon further questioning, I discovered that the division in question owned two trucks, and the titles of the two drivers were superintendent and assistant superintendent of transportation, respectively.

—NIKOLA TRBOJEVICH, *Research Engineer, Timken-Detroit Axle Company.*

Should Small Shops Co-operate?

Few machinists or garage men, though able to operate a small shop, are competent to handling book accounts, or to keeping their affairs in order on paper. Yet, no shop with less than seven or eight workers can afford a full-time bookkeeper.

In Baltimore, there are several methods in use. A group of energetic accountants, knowing the extreme need, formed a company. Their method is to take over the bookkeeping needs of many small concerns, at an average weekly cost of about ten dollars each. The shop owner has printed forms on which he keeps miscellaneous items, such as cash expended, receipts, credit

charges, and incoming invoices. Each day, a messenger is sent for the slips of the previous day's records. But even this demands clerical work by the shop owner, such as correspondence, usually a distasteful job for him. He must spend ten dollars a week for this privilege also. Therefore, such a method has not met with success.

The most successful of the small concerns, and those which usually outgrow these difficulties, arrange for the owner or one of the partners to take a course in double entry, so he may handle the bookkeeping after shop hours. True, this is a hardship for the one selected, but it is the road to success. Or, if a man has a wife or daughter, to co-operate, who will do the posting and typewriting, the job is done easily.

—Raymond H. Dauterich,
The Crescent Engineering Company.

Why an Organization Chart?

Lines of authority are best established by an organization chart. The overlapping of or the lack of authority is exposed and can be easily remedied. As each man knows his status, he can make his recommendations, suggestions, requests, or orders to the proper person in order that the best results may ensue. The initiative of every member of the organization will be stimulated along the proper lines. The efforts of all will be coordinated for the common good. Such a chart will promote the efficiency of the whole organization by eliminating duplicated effort, removing causes of friction, and encouraging co-operation.

—L. O. Brown, *Toolroom Foreman, Holcomb and Hoke Manufacturing Company.*

Pensions or Leaky Payrolls?

Recently the Lord Privy Seal was asked whether it was the government's intention to introduce legislation for the purpose of providing pensions for work-people of 60 years of age. It was suggested that this would make their places available for others. This news item serves to show the growing interest which is now taking place regarding the employee.

Companies which conduct their business on humane lines agree that they owe something to older employees. The problem is not properly dealt with if it is left to the unaided judgment of the manager. He may take a sympathetic view, or be hard and unimaginative.

There are several ways which may be suggested for meeting the ever recurrent difficulty of the older employee. One is by transfer to another sphere of labor. This will often provide a solution, especially where an employee will accept transfer at a lower salary. Where provision is made on these lines, the record of the employee is of first importance and should take precedence even over length of service. The order of choice should be efficiency of service first, family responsibility next, then length of service, and age.

If some way could be found to help the older employee to retain a youthful outlook, the problem would not be nearly so difficult. This is an aspect of his job which unfortunately is largely neglected by the average employee. He often allows himself to grow old mentally as well as physically. He should be encouraged to see more in his job than a routine carrying out of his daily task. Teach him to be creative. Help him to see that boring, turning, filing, or whatever he is doing is part of a process which, when completed, is for the use and benefit of others, and does not end with his pay envelope.

Further, encourage him to keep his mind fresh by reading. Show him the difference between reading for passing interest and reading for profit and use. Encourage him to retain the facts and ideas which help to make his mind active, as well as broaden his outlook.

Still another way is to help him to retire voluntarily from service at a reasonable age. Many employers do desire to make provision for this desirable object, but the great cost of individual effort has deterred them. Investigation of the problem has only served to show that the amount of capital to be set aside is prohibitive. In the past, there has been a lack of co-operation, but today the difficulty may be overcome by applying the principle of group insurance which spreads the liabilities of industry.

—J. W. Pepperdine, *Sec'y. of the Works Council, Barfield & Perkins, Ltd., Peterborough, England.*

Who Should Do the Firing?

Personal differences no longer constitute good and sufficient reasons for the discharge of a first class man. If a workman does not suit the foreman, he is usually transferred to some other department in the expectation that he may suit the work there. In such plants, it is customary to give a man three trials before finally discharging him.

In some shops, it is made rather difficult for a man to quit his job without a good reason. Before he can draw his money, he is invited to visit the office of the employment manager and explain his reason for leaving. He can of course leave, but he is shown that it is the wish of the company to keep him and to find work on which he can make good. Interviews of this kind enable the employment manager to sense any undercurrents which may be running through the shop. They also make the workman feel that he received careful consideration, and was not turned adrift owing to some individual who may have a personal grudge against him. Wherever the power to discharge men may be lodged, it is clear that dismissing a man is not something to be done lightly. —J. M. Livingston, *Thornliebank, Scotland.*

Who Shall Do the Firing?

It depends to a great extent on the type of worker employed whether it is necessary for the foreman to have the power of instant dismissal in his hands. In Germany this power is greatly curtailed by law, and the worker can bring an action for damages for unreasonable dismissal or victimization. My inquiries fail to reveal any serious complaint that discipline has suffered.

I have some acquaintance with plants where foremen have the power of firing and of others where they either do not use this power or have allowed it to fall into disuse. On the whole, discipline is much better where the firing is done by an employment manager who acts in a judicial capacity.

Many really excellent foremen are not fitted to exercise this power and carry out their duties better without it. Shorn of this power, they have to rely for their authority more on sheer ability and power of leadership.

—H. James, *Birmingham, England.*

Fifty Years of Machinists' Tools

Fred H. Colvin
Editor

A bit of history—A little reminiscence
—Present trends in Measuring

FROM whatever angle we view the mechanical advance of the past half century none is more significant than that of the making and use of tools for measurement. Fifty years ago the micrometer, though in use to some extent, was a rarity as compared with the plain caliper, generally known as the firm-joint caliper. Beam calipers with vernier readings held a proud place in the toolmaker's kit and were carefully and properly put to bed in plush cases when not in use.

Machinists made many of their own tools. Some of the more ambitious, who aspired to micrometers, but to whom the price seemed prohibitive, made their own, such as they were. But cutting a good 40-pitch thread was beyond most of them because few precision lead screws were in existence, and there was little thought of checking such tools for accuracy. The proud possessor of a "bought" micrometer was arbiter of measurements in spite of the fact that it might measure incorrectly.

In those days no one ever thought of such a plebian abbreviation as "mike." The full name was none too good for it. A micrometer reading to thousandths was the last word in precision measurement regardless of the age of the tool, the temperature, or the way in which it may have been mistreated. And though some other tools such as squares, rules, and dividers were made and sold by a few well known concerns, the demand was not considered sufficient to warrant a shop devoting its whole energies to making them.

It was under such conditions that the first shop specializing in machinists' tools and nothing else was established. Beginning with an idea for a square having a movable blade that could be adjusted to project different lengths from the stock or head, Laroy S. Starrett in 1880 started a small shop in Athol, Mass., on the banks of the Miller River from which his power was derived. Prejudice in favor of the fixed blade square made progress slow at first. In fact the toolmaker who made the first one for Mr. Starrett told him plainly but forcibly that he "wouldn't give a damn for one of 'em." But the idea grew, aided presumably by the fact that one square with the adjustable blade saved the toolmaker from buying several of the fixed blade type. And from the little shop, which had grown somewhat when the writer first knew it 35 years ago, with its original 1,500 sq.ft. of floor space, there is now a plant with 226,000 sq.ft. of floor space, employing 700 people on small tools alone.

To the square were added protractors, levels, calipers of many kinds, both firm-joint and beam types—with verniers and micrometer readings on the latter. Micrometers of both conventional and special types came as a matter of course, line after line being added until at present over 2,500 different numbers and sizes of tools go to make up the troubles of those charged with manufacturing, stocking, and shipping. Beam calipers have largely disappeared, but the vernier principle still holds sway in connection with special scales where jig-boring and similar machines must give accurate locations on the movement of various parts.

Micrometers of various types, and these include the separate measuring heads or barrels that are also used in measuring the movement of machines and similar parts, now form a large part of the demand for measuring instruments. But even with this heavy demand, and in spite of the trend toward closer measurement, the old type of firm-joint caliper and divider still forms over 50 per cent of the caliper business so far as bulk and numbers are concerned.

It is also of interest to note that the automotive industry takes a large percentage of the total output of tools. This includes such special tools as dial gages for measuring cylinder bores and other tools that have been developed to meet the needs of builders of motors and cars. Many of the same instruments are of course suited to the mechanical end of the airplane motor business.

ACCURATE instruments require both good methods of manufacture and careful attention to the proper use of machines and methods. And after any instrument is completed nothing but careful inspection can set the final value on it. Standard measuring blocks of a degree of accuracy undreamed off at the founding of the business fifty years ago help check the accuracy of screws and productions. Neither is one set of blocks considered sufficient, nor is it assumed that "once right is always right," for these test blocks go back to the maker at regular periods for careful checking to offset the "growing" of blocks as they age, or the effect of wear and temperature. Optical flats and microscopic instruments that would open the eyes of the old instrument maker are also used to check and double-check against error.

This is done both for the sake of securing a known degree of accuracy and to be sure that instruments will pass inspection in the laboratories that are now used by large buyers to check the quality of their purchases. It is not sufficient that the tools be accurate when received; they must also remain commercially accurate in use. Regular inspection of all instruments used in measuring machine parts, whether the tools are owned by the company or by the workman, is now the order of the day.

These are only part of the changes that have taken place in the thirty-five years since I first visited the Starrett plant where Mr. Starrett himself pointed with pride to the fifteen-year-old business that he had established. The growth to its present proportions reflects credit not only on the business ability of the heads of the concern but on the realization of the machine industry of the necessity for ever greater accuracy, and of instruments that will aid in securing an increasingly better product at lower costs. One may well speculate as to how much our industrial growth has been dependent on accurate instruments for measuring its products.

Machining
Buda Cylinder Blocks

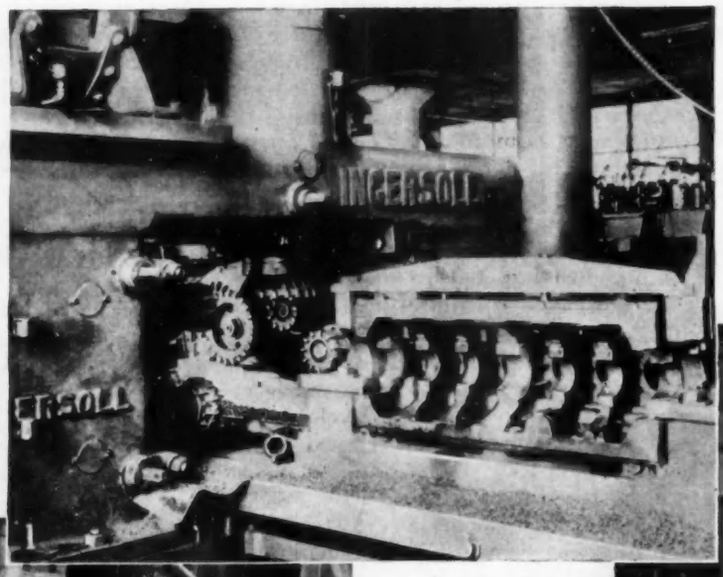


Fig. 1 — The first machining operation on the block is to mill the top, bottom, and one side in this special-purpose miller. Two small roughing cutters are set ahead of the finishing cutters on each side head

Fig. 3 — Bearing cap side fits are finished with the cutters shown, after a duplicate set on the other side has roughed them out. An end mill cutter mounted on a horizontal axis finishes the bottoms of the seats, while a similar cutter on a vertical spindle mills the valve cover seat on the side

Fig. 4—Straddle milling of the bearings is performed in this unit. The workhead is lowered into the cutters

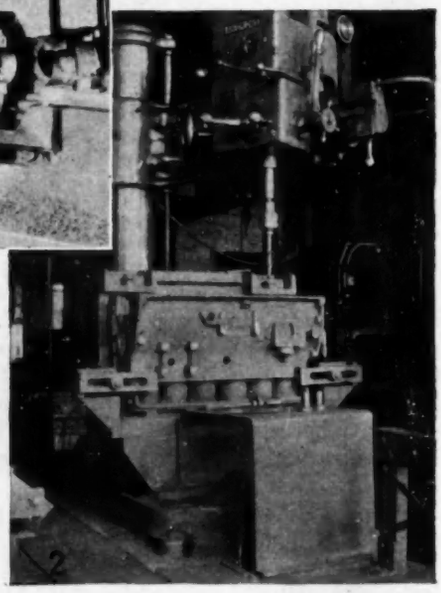
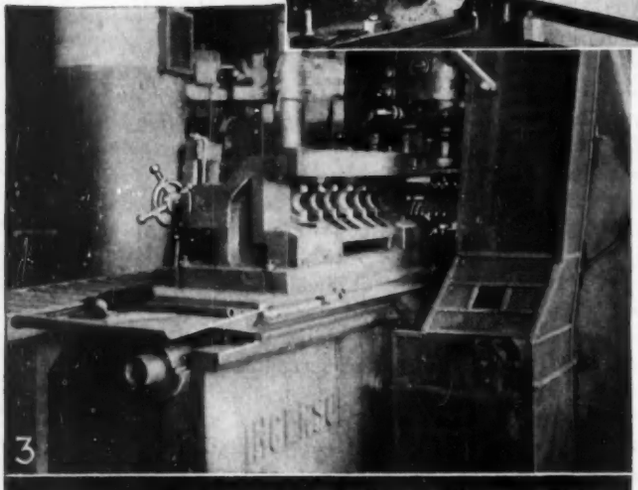
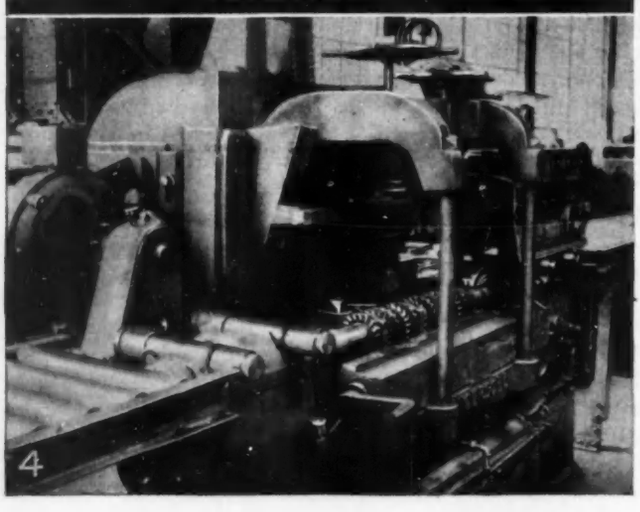


Fig. 2 — Two master locating holes are drilled and reamed in the flange for positioning the block during most of the subsequent operations





WHEN the Buda Company, Harvey, Ill., recently designed a new series of 4- and 6-cylinder motors, it was decided to produce the main parts on entirely new production equipment. The accompanying illustrations show progressively the chief operations in machining the cylinder block casting. This line is flexible enough to take care of three sizes of 6-cylinder models with $3\frac{1}{8}$-, $3\frac{1}{2}$- and $3\frac{3}{4}$-in. bores, and two 4-cylinder models with $3\frac{1}{2}$- and $3\frac{3}{4}$-in. bores. Changeovers from extreme to extreme in models take only a few hours. With present equipment a production of 100 motor blocks is obtainable in a $9\frac{3}{4}$-hour day. The economical manufacturing lot is 1,500 to 2,000 blocks, although trial runs of 600 castings have been made in order to work out tooling problems for all five models.

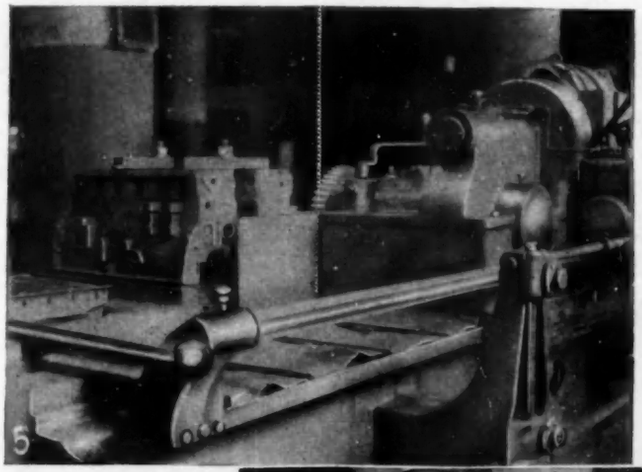


Fig. 5 — Two cylinder blocks, face to face, are clamped in a fixed position while the cutter head is advanced past them, finishing the ends. Deep-hole drilling for an oil passage follows in an opposed-head hydraulic unit

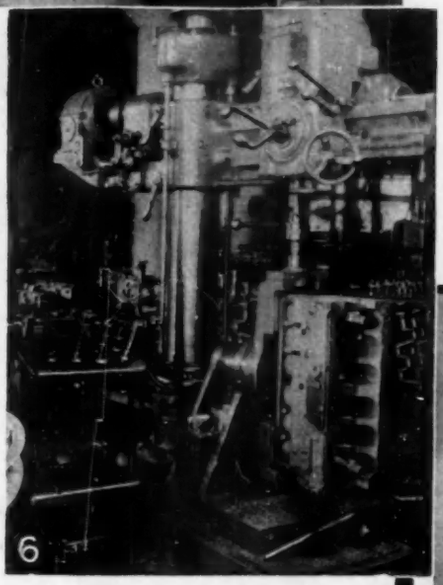


Fig. 6—Core, drain, and expansion plug holes are drilled and tapped with a 3-ft. radial drill while the work is held in a fixture rotating about a horizontal axis

Fig. 7—A series of rough boring and drilling operations. In the first unit, the cylinders are rough bored, three at a time, in two settings; in the second, the valve seats are bored; in the third, the valve stem guide holes are drilled

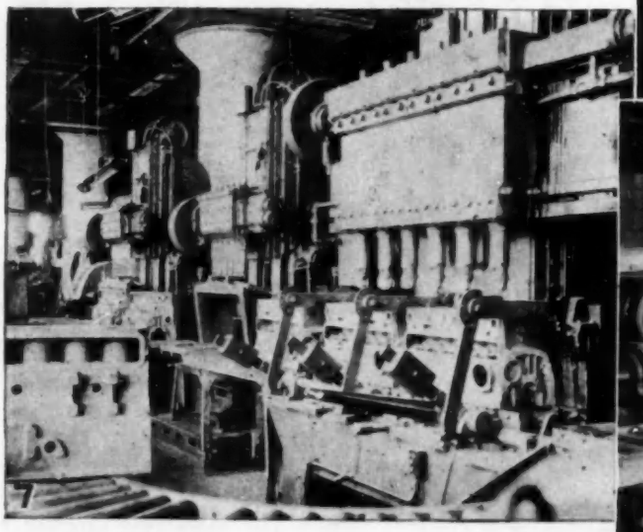
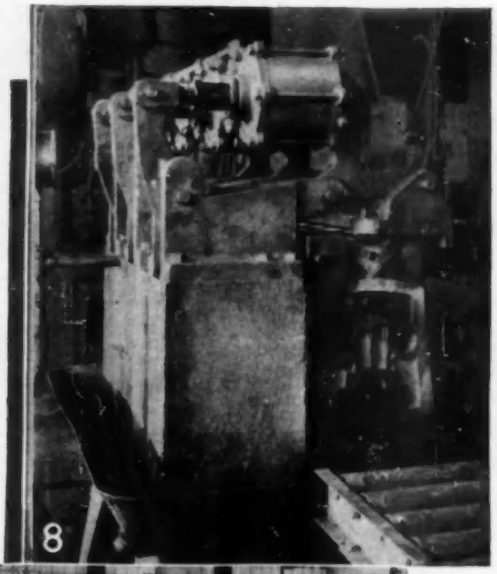


Fig. 8—Leaving the valve and cylinder boring machines, the blocks are tested for leaks in the water jacket under 80-lb. hydrostatic pressure. The ports are sealed by three pneumatic clamps



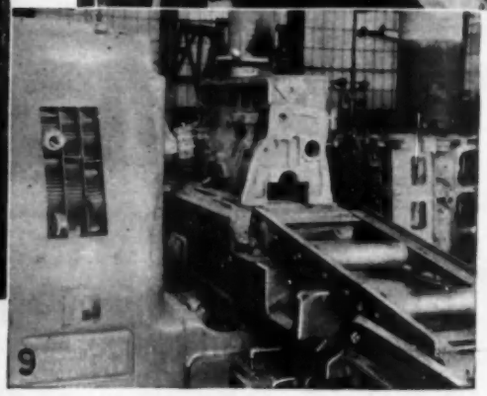
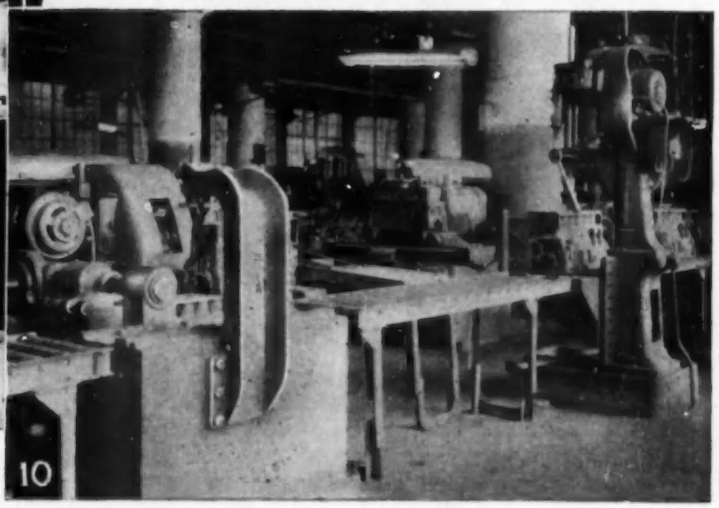


Fig. 9—One of two hydraulic milling machines used to mill bosses on the sides of the castings

Fig. 10—Right, cylinder chamfering unit; left, boring head for generator bracket side opening



Machining Buda Cylinder Blocks

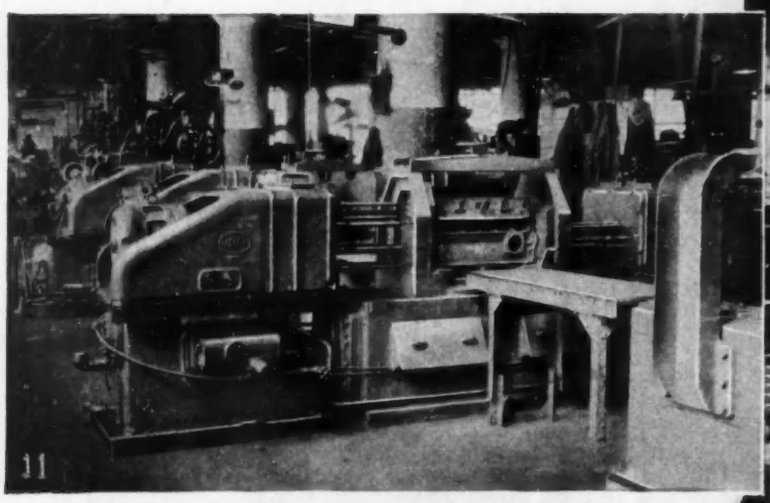


Fig. 11—Battery of three hydraulic-feed drilling units in which all stud and bolt holes are drilled

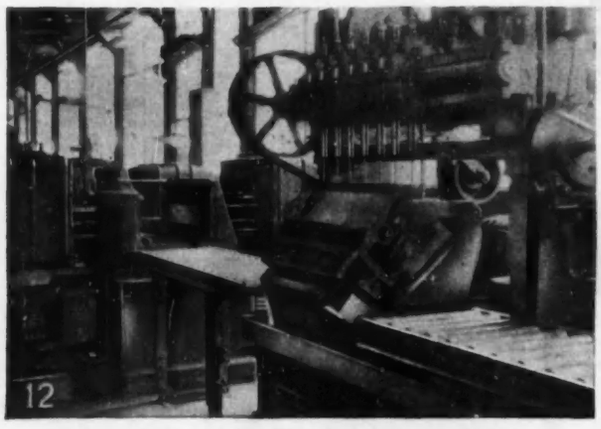
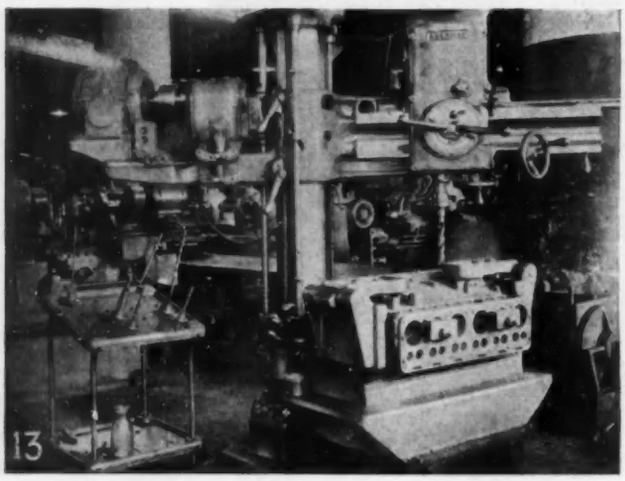


Fig. 12—With the cylinder block held upside down and at an angle, seven deep oil channels are drilled with this multiple-head unit

Fig. 13—One of four radial drills used in conjunction with box fixtures and hinged jig plates to drill miscellaneous holes not finished in the multiple-spindle units



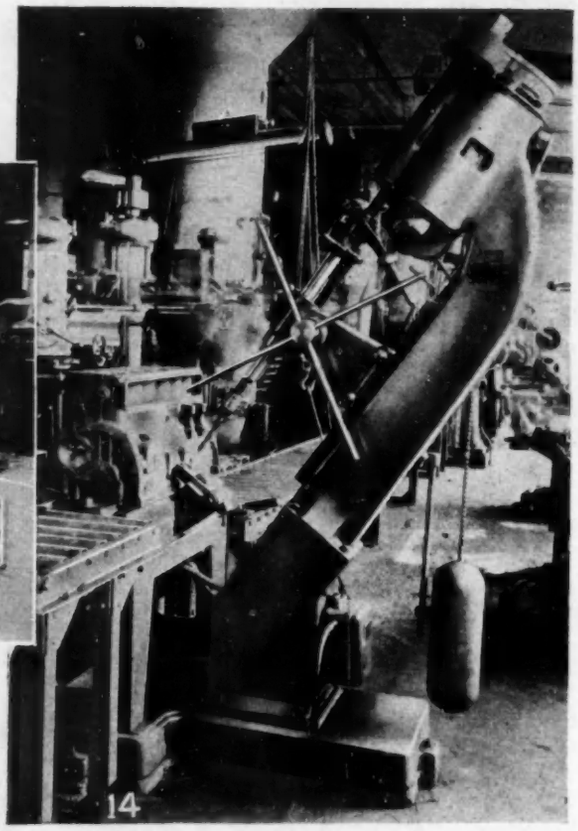


Fig. 14—A special base has been supplied to set this drill head at a 60-deg. angle for drilling and tapping the oil gage hole

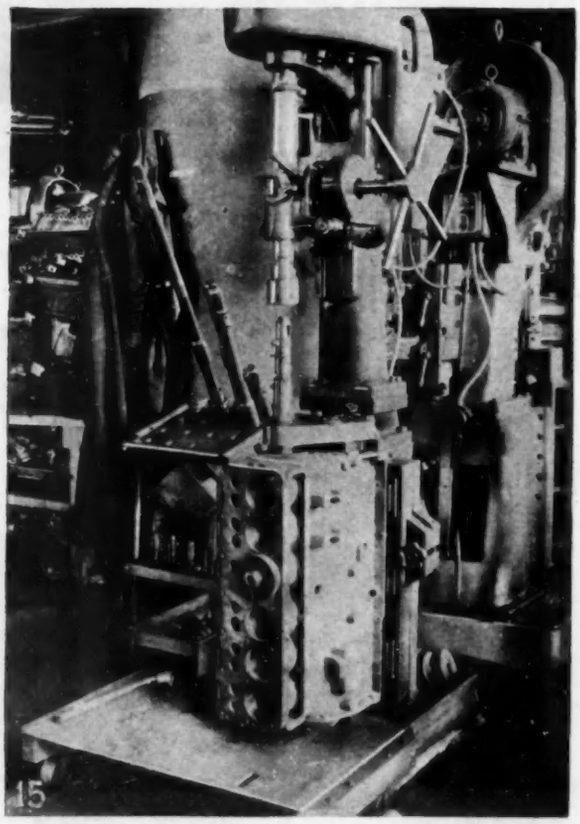


Fig. 15—Camshaft bearings are rough bored in this vertical drill. The casting is clamped to a hinged fixture that can be swung out so that the cutter bars may be withdrawn without interference

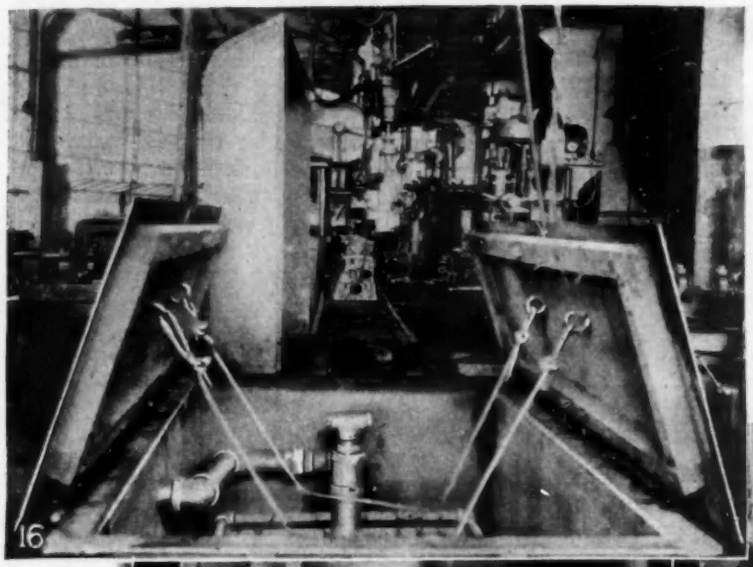
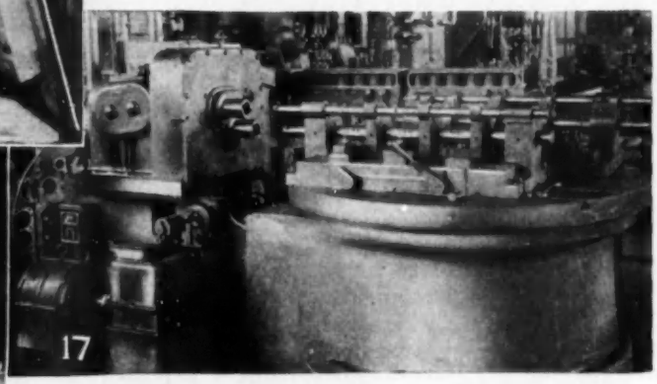


Fig. 16—Following the tapping operations, the cylinder block is washed. All chips and excess water are blown out at the bench, facilitating assembly of the bearing halves with cap screws

Fig. 17—Indexing table carrying two sets of boring bars and fixtures for roughing the main and camshaft bearings. Hydraulic feed is used for the head



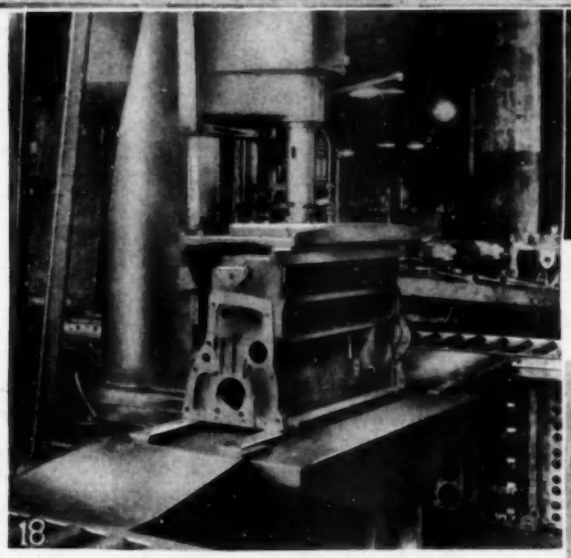
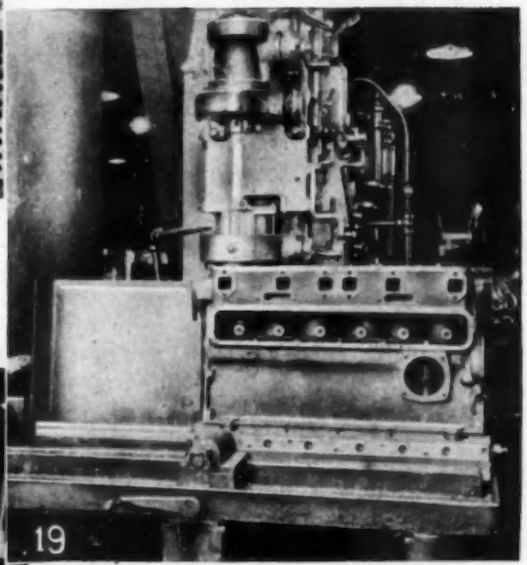


Fig. 18—One of two single-spindle machines used for finish reaming the cylinder bores, one at a time. Previous to this the valve stem bushings and the camshaft bushings have been pressed into place, the latter reamed, and the valve seats counter-bored and chamfered



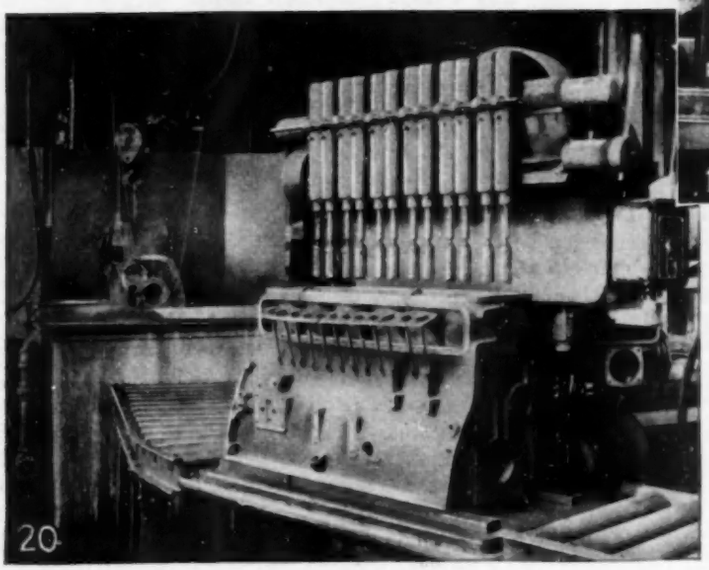


Fig. 19—Each cylinder is honed in this unit. The casting is located by master pins in a carrier plate sliding in guides. Exact positioning for each bore is accomplished by index holes in conjunction with a locating pin

Fig. 20—The last operation is to grind the valves in their seats with this 12-spindle unit. Then, with the valves racked on the side as shown, the casting is washed

NEW BOOKS

TRUE VALUES IN BUSINESS AND BUYING. *By C. G. Padel. 215 pages, 5x7⅜ in. Indexed. Published by B. C. Forbes Publishing Company, 120 Fifth Ave., New York, N. Y. Price $2.50.*

In comparison to the functions of selling and manufacturing, buying has received scant consideration, according to this volume. Too often the purchase of materials is regarded as a necessary evil with but a remote relation to profits. The result has been close curtailment of expenditures for purchasing departments, with control of this important activity often placed in the hands of an unimaginative personnel. Previous books on the subject have emphasized the mechanics of buying rather than the fundamental principles and their application as disclosed by this author.

The most common error in buying is that of making price paramount. This costly practice is engendered by ignorance of other considerations or a desire to create a favorable impression toward those in charge of purchasing. The benefits of truly sound buying are often intangible and spread over a term of years. When they do become evident those responsible do not always receive due credit. Even where quality is maintained, there are dangers in forcing a vendor into excessive price cutting.

The author's treatment is essentially philosophical—so much so that he at times digresses from the subject of buying into the broader field of human conduct. While these views do not detract from the book's interest, they expand the available material somewhat unduly.

ROBOTS OR MEN?—*A French workman's experience in American Industry. By H. DuBreuil. Translated by Frances and Mason Merrill. 248 pages, 5¾x8½ in. Published by Harper & Brothers, New York and London. Price $3.00.*

Be prepared for a shock when you pick up this account of what a French workman and labor union official saw and experienced in a number of American factories, all but one engaged in some form of metal working. Instead of the usual superficial and prejudiced estimate of the shortcomings of American life and work we have here a beautifully written story of the impression made by our methods and habits on one who actually lived with them for many months.

A machinist by trade, but more recently secretary of the French Federation of Labor, the author came to the United States as a journeyman machinist and made his way from job to job, as a skilled workman, and as a critic with no reason to be favorably predisposed to American practices. What he has to say in his book, then, is not only flattering to American industry but a real tribute to his own breadth of vision. For, in general, he is heartily favorable to many of the things for which American industry stands, and to the way in which it goes about attaining these standards.

The first part of this book, which includes the experiences of the author in getting jobs, and his first impressions of the United States, is more entertaining than the remainder of the work. Many American employers will differ with his ideas on unionism, but that is to be expected because of Mr. DuBreuil's training and vocation. They cannot but be flattered by his outspoken approval of what he calls the American formula for hiring, "Let's see what you can do."

Mr. DuBreuil has been fortunate in his translators. They have produced a translation that is remarkable for its fluency and ease. The book is far more interesting than most of the modern "realistic" fiction.

HOW TO WRITE A BUSINESS LETTER.—*By Marion G. Fottler, adviser for women, college of business administration, Boston University. 283 pages, 6x9 in. Indexed. Cloth boards. The Ronald Press Company, 15 East 26th St., New York, N. Y. Price $2.75.*

Effective letters are rarely a matter of chance. Rather, they are the result of careful study, knowledge of letter-writing principles, and proper perspective. A letter must reflect all of these things to achieve its purpose, which is a substitute for a personal interview.

To get results, letters must have neat appearance, correct punctuation, and paragraphs completely and concisely developed. These things are clearly set forth in this book, together with kinds of letters, use of form paragraphs, and many other worthwhile points—all presented in an interesting fashion to the business letter writer.

THE BUSINESS MAN AND HIS BANK.—*By William H. Kniffin. 332 pages, 5½x8 in. Cloth boards. Indexed. Published by the McGraw-Hill Book Company, Inc., 370 Seventh Ave., New York, N. Y. Price $3.00.*

Some thirty years or more ago there might have been question concerning the propriety of reviewing this thorough work in a technical magazine, but industry has long since gone into copartnership with banking, and every manufacturer, executive, and operator should know his copartner. In this, the second edition, the author describes not only banks themselves, their departments, their powers, and their varied services, but how a business man may obtain maximum results in his banking operations. From his experience as a banker and from his teaching as an instructor in banking practice at New York University, he clarifies the whole field. As he says, "Banking and business are so closely related that each would be impossible without the other."

Ten years have elapsed since the publication of the first edition; times and methods have changed, as much in banking as in manufacturing. This work incorporates the best of modern practice; it is well written, authoritative, and timely.

YEAR BOOK OF THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, 1930. Published by the Institute, which has headquarters at 39 West 39th St., New York, this year book is primarily an alphabetical and geographical list of the membership, but considerable information relating to the present status of the numerous activities is also included. The report for the year ending April 30, 1929, is published in full.

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Why the Metric System?

ANOTHER drive to pry us loose from the English inch and get us out of the "backward nations" class is on. Representative Britten is again trying to secure for us the benefits of the metric system, even if he has to force us to take the dose that is to multiply our foreign trade. The pro-metrics insist, and many editors of magazines fall in with the idea, that we are a benighted set not to have stepped into line long ago.

What nearly everyone seems to overlook is the fact that no legislation is needed to permit anyone who prefers the metric system to use it. It has been perfectly legal for many years and is being used to a considerable extent in some industries that find it suited to their needs. Those who prefer to use the English system of measurements have no thought of preventing the use of metric measurement by anyone who prefers it. Few of those engaged in building machinery of any kind have so far considered it advantageous to make the change; few are convinced that they are losing business by adhering to the old system.

Builders of machinery can hardly be called ignoramuses

The builders of the machinery that has made this the foremost industrial country on the globe can hardly be called ignoramuses, and it seems likely that if the metric system had the advantages claimed by its advocates a goodly percentage of progressive machine builders would have adopted it long ago. Instead, however, they have fought every attempt to force upon them the use of the metric system. If this system really had the advantages claimed, its advocates could rest quietly until those who now persist in clinging to the old system see the error of their ways. Compulsory legislation would be unnecessary.

The cost of making the change would involve millions

There are other sides to the question. The cost of making the change would involve millions. To offset this, business would have to increase beyond all present prediction. Investigation has failed to show any appreciable loss of orders because metric measurements are not used in building machinery. At least 75 per cent of all the machinery in the world is built to English measurement, even though the metric system has been the adopted standard in some countries for many years.

Officially adopting a standard does not insure its use

Officially adopting a standard, moreover, does not insure its use. Take any country for example. Even in France, the stronghold of metrics, some of the old units still persist. In Japan, frequently referred to as a metric country, metric measurements are by no means common. The government railway time tables give miles instead of kilometers, and the old Japanese units of weights and measures are used in government reports. Yet the metric advocates point to Japan as an example of what a progressive nation can do by adopting their system.

Only those who have tried the translation of accurate dimensions of intricate machinery know how difficult it is or what it costs

Some recite glibly that it is a simple matter to translate our English measurements into metric and that only stubbornness or laziness prevents this being done. Only those who have tried the translation of accurate dimensions of intricate machinery know how difficult it is or what it costs. Such a translation involves the use of more decimals than there are fingers on your hand and greatly increases the chance of error. Instead of translating the dimensions of the present machine it might be cheaper to design a new one using the new measurement. And unless enough additional business is likely to result, what machine builder is going to incur such an expense except under compulsion?

If the government specified metric dimensions on all the machines it ordered, the government would find itself cut off from the best sources of supply

A favorite method proposed is to have the government specifications require metric dimensions on all machines ordered, thus compelling the builder to abandon the old measurement. Such a proceeding would probably work out very differently. Except in a few cases, the government business is so small, in comparison with commercial orders, as to make it of little consequence. Few machine builders would be tempted to incur the cost of changing all their designs, tools, and fixtures for the sake of a few government orders, especially when it might mean the loss of other orders from large concerns that do not want to mix two kinds of measurements in their plants. Quite possibly the government would find itself cut off from the best sources of supply.

Economy, not theory

Economies and not theory should govern in matters of this kind. The manufacturers of any product, far better than either legislators or theorists with no financial interests at stake, can be depended upon to know when it is to their advantage to change the measurements or designs of their products.

■

Chrome-vanadium spring wire will retain its elastic limit under much higher temperatures than ordinary spring wire, but costs approximately four times as much.

The Foreman's Round Table

PLAYING FAVORITES

"MORNING, Ed," hailed Al, as he dropped into Ed's office. "Let's see if there is anything worth masticating over at the 'greasy spoon.' It's so darn hot I really don't care whether I eat or not."

"Hot, huh? If you had seen me an hour ago you would thing you were shivering. I was so hot I sizzled."

"I did see; I dropped in on my way back from the front office, but when I opened your office door the blast was too much for me and I withdrew. If I were you I would put in a requisition for an asbestos lined office with an exhaust system. Can't you see, Ed, how foolish it is to let yourself get all worked up? Your teeth chatter still from nervousness, and I bet it wasn't worth it."

"But it was; I was upholding a principle. As long as I am foreman no man can tell me what jobs I can or cannot give him, or what jobs he will do."

"Was it as bad as that?"

"Sure it was. That big press over in shop No. 3 busted just after starting up this morning. The millwright looked it over and said that the clutch needed some new parts and would I let him have a machinist to help him. I told him to take Swanson."

"Well, I don't see anything to get het up about yet."

"There wasn't—until Swanson barged into the office and wanted to know why I gave all the dirty jobs to him and the good ones to someone else. I told him that I didn't play favorites and for him to do as I told him or get his time."

"Didn't he have just a little bit of justification for his kick, Ed? Doesn't Phillips usually get the new work and poor old Swanson the repair work?"

"Maybe, but Phillips is an A-1 man; always neat and clean, and it just don't seem right to put him on a dirty job. Swanson is different."

"Maybe he is, but he's a good man. You pay him as much as you do anyone else, don't you? You're not prejudiced because he's a squarehead, are you? From my point of view he's a darn good man."

"No, I am not prejudiced, he is a good guy, but he takes exception to everything I tell him. He has me 'nuts' half the time. I'd rather do a job myself than have an argument with him. Giving him a job like that is the only way I can get back at him. I don't do it to be mean, but I've just got to teach him to quit arguing with me. If he wants my job let him make application for it; not drive me 'bughouse.'"

"Don't be foolish. He don't want your job. He just likes to talk. Try humoring him a little."

"Yes, old pacifist—lie down and let him walk over me. You play favorites just as much as I do, only you can't see it."

"No, I'm one of those unfortunates that leans over backward and imposes on his friends for fear people will think he does play favorites. If a man wants to hold his job, all he has to do is get me down on him. I won't fire him, because I fear I may be doing him an injustice. Well, let's get back to work."

"Yes! Get back on your throne, Gabriel."

Not playing favorites also means denying to one, that which cannot be granted to all. Many people resent this, but does it affect their opinions as to the squareness of the "boss?" Is Ed right in displeasing one man to keep several others satisfied? Both foremen, and the men that get the "dirty" jobs are invited to discuss this question.

▸ ▸ ▸ Discussion of Former Topics

Spring Song

This particular subject I have always considered an important factor in all shops. Every factory seems to be up against the same "Spring Song," more wages.

I would like to see a formula tried, similar to the one adopted by the U. S. Navy and the Merchant Marine engineering departments. That is: using a standard scale of wages and dividing the branches of mechanical trades into several classes. For example, 1st and 2nd machinists and toolmakers, grading all workers according to ability and length of service. New men are told the formula used when placing them in their respective trades and classes.

A set scale will keep the worker contented because he will know that there is a limit in his class, but that he can qualify for a higher rating. —Ernest Mason.

When Personal Tools Are Damaged

When a man is hired, he is expected to bring his own small tools with him. If any get broken, it is his lookout, and he is, therefore, more careful in using them than if they were the property of his employers.

The tool-maker is not the only one who requires small tools. The turner or fitter in the shops may require a good many tools out of the general run at times. He either borrows them or else does without, in which case the company is the loser. Surely the best plan is to make each man bring his own kit of the usual tools, and for the company to supply such tools as are out of the usual run.

The wages of a tool-maker, while above the rate of the fitter or turner, do not leave room for him to invest in a large kit of small tools. A tool maker is paid an hourly rate above that of the ordinary workman for the simple reason that he is supposed to be a man of greater ability and skill, not because he has tools. I was once taken on at an engineering shop as a turner and was paid a rate well over that of the ordinary turner, but when I got to the lathe there were no tools or any other articles with it. Upon applying to the foreman, the latter replied, "We pay you a good rate and we expect you to supply your own tools." I resigned at once.

—G. George Woodcock, *London, England.*

New Drills and Old Men

Some years ago my shop bought a new American radial drill press. I made use of this event to show my men that a new machine is not a thing to be feared, but rather a possibility for a bigger pay envelope. I gave the operator the assurance that his earnings (in piecework) would increase by one third of the savings made with the new drill press. I told him that another third of the saved time would be used in the customer's favor and the remaining third in the factory's favor. I told him, further, that this arrangement could be maintained only if he was willing to make good use of all the advantages of the new construction according to my instruction. The method was successful. Since that time my workers like to see new machine tools ordered by the management. I think the method I used may be successful in other shops because it satisfies the three parties who were interested, the user of machine tools, the customer, and the worker. —Franz Bermann, *Engineer, Vienna, Austria.*

Why Conferences Anyway?

Conferences are just as necessary as raw material, and they should be treated as such.

If he who calls a conference looks at it in that light and does not call one until the topic is clearly defined and a definite goal is set, then these get togethers will just naturally be valuable.

While I personally believe that a foreman's conference should be presided over by the general foreman, this can be done away with, if desired, by electing a chairman at regular intervals.

The main point is that the object of the conference should be stated beforehand, giving each member a chance to prepare, and no going off the track should be tolerated.

To make these meetings as short and snappy as possible, those most affected should get together beforehand and possibly come to some conclusion. Then, if the question can be settled out of court, so to speak, a lot of time and expense will be saved. In that event the facts can be presented for approval or improvement, thus giving the discussion a good constructive start.

—J. C. P. Bode.

Mottoes in the Shop

Mottoes will and do influence the men in the shop, provided they are the type of men that are dependable and reliable. The man who is interested in his work and likes his job will notice these instructive mottoes and heed them to his own benefit and to the benefit of his employers.

There will be some, to be sure, who will resent and laugh at them. These men will be of the type that is thinking only of higher pay, disregarding the safety and precision of their work to gain it. There will also be some, like Ed, who feel they know how to handle their jobs without instructions.

—G. Cook, *Assistant Foreman, Studebaker Corporation.*

Keeping Machines on the Job

Letting a machine break down before repairing it, in the great majority of cases, seems to me to be the most economical procedure, unless the plant is very large, and the product one made to fine limits requiring the machines to be kept finely adjusted. In either case the machine involved will be out of commission, and, under the maintenance idea, it would be taken out of production perhaps to make a busy looking maintenance depart-

ment, and so, on the surface, make a good job for the maintenance boss.

In the average shop, responsibility for use and care of machines should be under the man who has to get production from them. The production engineer, if there is one, the foreman in charge, if there is not, should decide when a machine is to be out of production, and the length of time it is to be out. I think it a mistake to have more departments than absolutely necessary, and the foreman should have authority over the tools placed at his disposal if he is to be held responsible for the quantity and quality of the work coming from his department. —ARTHUR BRAMWELL, *London, England.*

Boss, or Advisor?

Tom made his mistake because of inexperience. If he had done his analyzing before he spoke to Gus he probably would have proceeded differently.

When he saw Gus reading he should have approached him and passed the time of day or engaged him in some pleasant conversation, then quietly turning the subject to the case in hand he might have asked Gus if he did not think he was setting a bad example for the young fellows in reading during working hours, conveying to Gus the idea that the young mechanics were taking him and the other older men as examples. Then, in an offhand manner, he could have quoted the rule against reading during working hours.

We must use psychology in handling all kinds and classes of persons. One person may be ruled by brute force, the next by coaxing, still another must be talked to "like a Dutch uncle," and still others must be left alone until their moods are receptive to approach.

One of the biggest mistakes a young foreman can make is to show off. He should try to impress upon the men that he is willing to help them and should do it in a very quite and unobtrusive manner.

—WM. C. BETZ, *Master Mechanic, Fafnir Bearing Company.*

Off With the Old, On With the New

There is an old axiom that "Birds of a feather flock together," which I think also applies to men and machinery. Shops that have only old and dilapidated machinery are usually manned by a crew of men who are more or less down at the heel. The patience of good men cannot stand the continuous trouble caused by working with such tools, if by chance they should happen to get work in such a shop.

The general appearance of a shop both outside and inside has a marked influence on the class of applicants. Some shops are known as "dumps" while others have a reputation for being clean and orderly. Machinists and tool makers like to appear as gentlemen between home and work, and shun any shop that is not kept up.

When a man goes out for a job he wishes to find the best one available. After having met an employment manager and being offered a job he feels somewhat obliged to take it if it is reasonable. This may be early in the day, so he goes to another shop and repeats. After several such visits he picks the best of what has been offered. This merely shows good judgment on the part of the man, and is not unethical.

—L. F. SWENSON, *Industrial Engineer, Perkins Machine & Gear Co.*

No Verbal Orders Accepted

Giving verbal orders in a machine shop, at least where dimensions are concerned, is one very sure way to find trouble. Many friendships have been dissolved and much valuable time and material wasted over that same neglect to "put it on paper." For instance: the foreman comes up to Joe Brown, the "rush order" lathe hand, and, handing him a shaft, tells him to reduce it in three different dimensions. Joe takes the job, puts it between centers, finds he needs a smaller lathe dog than he usually carries, and goes off to the toolcrib. When he gets there he finds two or three ahead of him, and waits. Waiting is tedious work, and, of course, he beguiles the minutes in conversation. When he finally gets back to the lathe at least two of the dimensions are vague, the other he is moderately sure of. The foreman having left the shop or having become deeply interested in some other problem, Joe decides to "take a chance" on his memory. The result is spoiled work and strained relations over the "bawling out" which follows. All this could have been prevented by a few seconds with pencil and paper. The man with the card-index mind is a very rare person seldom found in the average machine shop. So, where figures are concerned, it pays to have them in "black and white."

—ROBERT S. ALEXANDER, *Universal Winding Company.*

Government Work

The doing of "government work" is a very difficult thing to control. It requires the use of discretion and diplomacy. Little time will be lost from regular work by letting the men do small jobs, but care must be used lest bad precedents be set up. Sending small jobs through the regular channels is a nuisance. It hardly seems fair to charge a member of the organization with the clerical costs, yet the office work can not be done for nothing.

It is only natural for a mechanic to do "government work." He takes great pride in using his skill on a job for himself. There is little harm in allowing him to do an occasional small job. In fact, the granting of permission for such work will usually promote a better feeling toward the company. Yet it is a dangerous thing to allow too much of such work to be done. And the hard thing about it is to know when enough has been done.

—L. O. BROWN, *Toolroom Foreman, Holcomb and Hoke Manufacturing Company.*

Closing the Door to Late Comers

Some men seem to be proud of coming through the aisle to their lockers after the other men are working.

It may also be humiliating, if the control of the department is good, to be delinquent, and rather honorable to have a long clean record for punctuality.

Most employees who live far away from the works are punctual; they must be to catch their trains. Employees living within a half hour's walk from the factory are the ones to be found at the gate after the whistle blows.

To cure this, regardless of a man's ability, warn him once or twice, and, if he does not show his willingness to improve, discharge him, and the factory will benefit by it. There are none of us who cannot be replaced.

—SIGURD C. NIELSON.

"Necking-in" Drawn Shells—*Discussion*

Carl E. Schinman
Production Engineer, Aero Products Company

Chester B. Lord
Associate Editor

On page 68, Vol. 72, of the *American Machinist*, a solution to a problem in "necking" drawn shells 1¼ O.D. x 12 in. long, drawn from 16-gage steel, is offered.

The writer believes that the answer given is impractical for the following reasons: The length of the shells or tubes makes the use of a dial feed press impractical and, with most machines, impossible; buckling of the shells would take place under the compression load applied by the punches unless the shells were well supported both inside and out for practically their entire length, which is also impractical in the above type of machine; the answer given is based on the principles of drawing metal under tension, whereas, in the method outlined, the metal would be subject to compression and the wall would not wrinkle as stated.

We are at present using a spinning process for necking tubes of a smaller diameter but in about the same proportions as the finished tube shown in the article referred to above. Annealing is not necessary on the tubes we neck and probably will not be on the tubes referred to above if they are already well annealed.

These tubes can be spun in a turret lathe. In order to obtain an accurate inside form it will be necessary to support the tube by a mandrel turned to slip inside, form-turned on the front end to the desired shape. This mandrel should be secured inside the lathe spindle and allowed to project through the spring chuck only far enough for the spinning operation. The spinning is done by a freely rotating, form-turned and hardened roller attached to a suitable tool holder held in the cross-slide tool post. If faster production is desired a special cross-slide may be made that will advance two rollers to the work simultaneously from opposite sides. As the spinning operation forces the displaced metal to the front, the face of the work becomes ragged. This ragged face should be trimmed square and burred by tools held in either the cross-slide or turret.

In operation, the tube is slipped over the mandrel and into the spring chuck. The chuck is closed, and the spinning roll is next advanced to the work. The trimming tool is then brought into position. The burring tools, held in the turret, finish the work, and the cycle is completed by removing the work from the chuck.

This method closes the tube in a manner that produces a uniform product. The roller, and the holder that supports it, are rigid and do not require much attention in the way of repairs. I feel sure that this method is superior to any method of necking by means of dies as described in the article referred to.

Because of the unusual character of the work, and because the original illustration caused Mr. Schinman, and possibly others, to assume the shells were open at both ends, I am answering his objections and adding somewhat to the original discussion of "necking" and bulging. The fact that the shells in question were not open at both ends precludes the possibility of spinning them as Mr. Schinman advocates. The original inquiry asked for a method to be employed for large quantities in an economical manner, and for that purpose I know of no non-automatic method that excels the dial-feed press. The limit of the length or size of shell that can be done on a dial press depends upon the speed of the dial and the character of work to be done. Whether or not such a press should be used would depend upon the quantity required and upon the facilities available for the substitution of a different type of press. The number of operations done at one time would depend upon the capacity of the press.

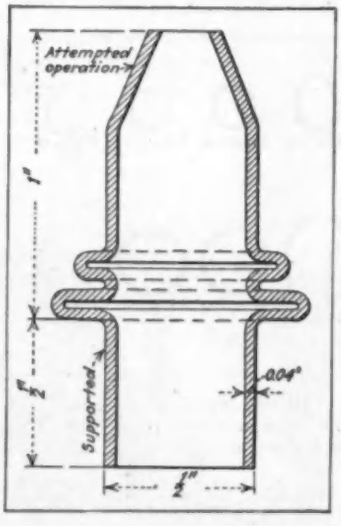


Fig. 1—Effect of too much reduction on a necking-in operation

The result of the pressure applied by the ram would extend no further than the supporting bushing, and any bulging would take place at its top. There is no reason why buckling pressure should be transmitted through the straight portion of the shell above the supporting bushing, through the bushing itself, bulging the shell below the bushing. In fact, there is no reason why it should bulge at all: the pressure necessary to "neck" the shell is less than that necessary to bulge it. Upsetting or bulging is a controllable commercial operation. It is employed, for example, on the ends of copper oil pipes, so that half couplings may be used without threading the pipe. It can be controlled both in size and in position, if the tube, except the part to be used for bulging, is supported on the outside. If too much material is left unsupported, more than one bulge will appear.

The bulge is the natural reaction of a tube to pressure. The writer has among his "junk" somewhere, a piece of

tubing of which Fig. 1 is a sketch, showing the effect of attempting too much reduction of an unsupported tube at one time.

If it were necessary to support a tube or cup both inside and out, it would not be possible to make hollow balls from tubing and drawn shells. Fig. 2 shows the method used in making hollow balls from both kinds of material. It is taken from an article by Tobias Dantzig, on page 877, Vol. 61, of the *American Machinist*. It will be noticed that the method used carries the first operation even further than I advocate.

The hollow ball is a commercial commodity. Made of either shell or tubing, it is a perfect example of the resistance of a tubular body, without internal support, to a compressive load. After the last press operation, which is "rounding," small holes are left. To close these, the balls are rolled in grooved disks and pressure is applied until the aperture is completely closed. Despite the tremendous pressure necessary to produce the plastic flow to close these holes completely, the ball does not collapse.

Size is relative, and of itself makes little or no difference in working, provided there is sufficient power. A bathtub can be drawn as easily as a lamp socket, with proportional power, and during the war hundreds of thousands of 8-in. shells were necked in so evenly that any subsequent finishing inside the nose was unnecessary. It cost some manufacturers considerable, however, to find out that pressing was better than spinning. An operation like spinning that bears against only one point at a time cannot be accurate unless the work has some kind of stop or support, such as Mr. Schinman uses. This off-center condition is not so noticeable in a small shell as it is in a large one.

I was submitted to some temporary criticism during the war because I insisted upon using a hydraulic press

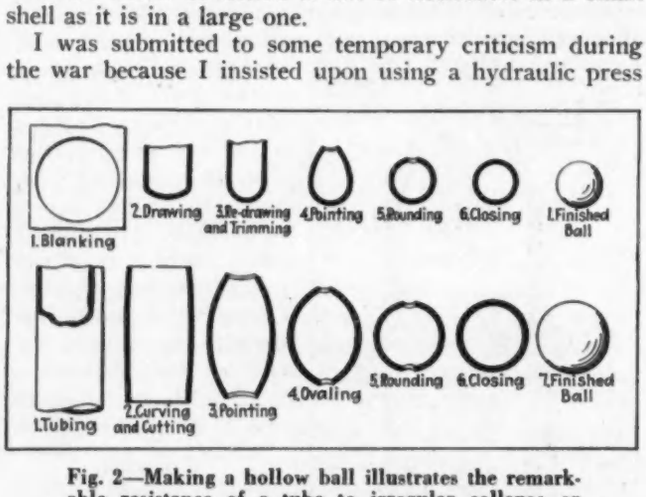


Fig. 2—Making a hollow ball illustrates the remarkable resistance of a tube to irregular collapse or deformation

for closing in 8-in. shells, while several of our friends in the same game intended to use Nazel hammers and an arrangement to revolve the shell. It was felt that the best practice should be chosen, and be adopted as uniform practice by all. My company was so worried about the situation that I consented to order one hammer in case, as they tactfully put it, "anything should happen to the hydraulic press." To shorten the story, the hammer stood in the warehouse, and, shortly, all our friends were buying hydraulic presses because they could not get a uniform, even-thickness shape of wall or length of shell with the hammer. The fault did not lie with the hammer, but with the principle. Using a hydraulic press, it was possible to finish turn the inside of the nose before

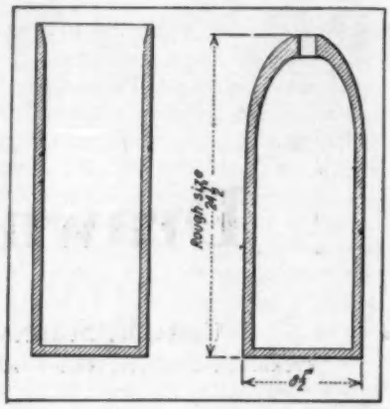


Fig. 3—Size plays no part in necking. These shells were completely finished inside before closing. The plastic movement is plainly seen in this thick metal

closing it in. There was a "kink" to it, of course, as there is to every good job. In this case it was uniformly heating the shell to a predetermined mark, and having that mark even, all around the shell. If one side was hotter than the other or was heated farther down, a lopsided shell was the result. This heat-treatment was analogous to annealing the open end of the small shells. The hammer was analogous to the spinning operation.

An open tube can undoubtedly be necked in by spinning, but it is a makeshift, because spinning shells in a lathe is not as economical as press work.

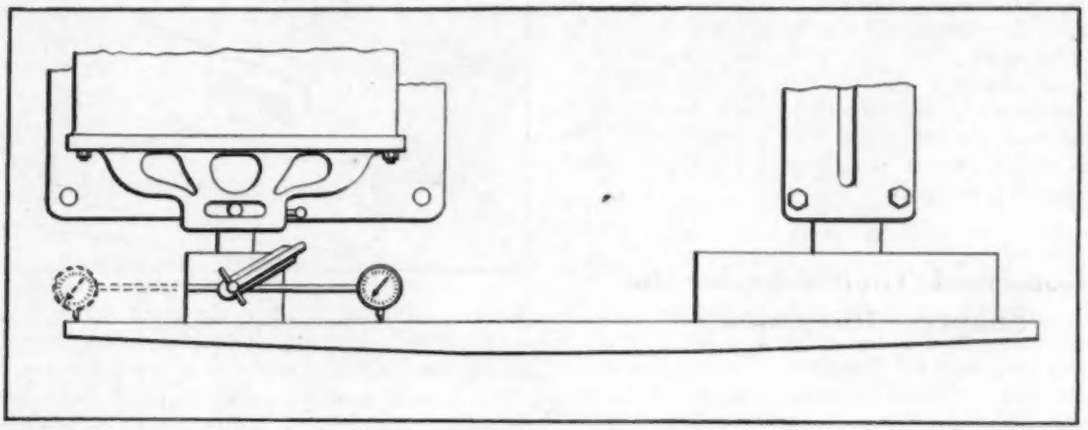
■

Ten Commandments of Good Organization

MR. M. C. RORTY, Vice-President of the International Telephone and Telegraph Company, presented the following rules for management at a recent meeting of the American Management Associations:

1. Definite and clean cut responsibilities should be assigned to each executive.
2. Responsibility should always be coupled with corresponding authority.
3. No change should be made in the scope or responsibilities of a position without a definite understanding to that effect on the part of all concerned.
4. No officer or employee, occupying a single position in the organization, should be subject to definite orders from more than one source.
5. Orders should never be given a subordinate over the head of a responsible officer. Rather than do this the officer in question should be supplanted.
6. Criticisms of subordinates should, whenever possible, be made privately, and in no case should a subordinate be criticized in the presence of officers or employees of equal or lower rank.
7. No dispute or difference between officers or employees as to authority or responsibilities should be considered too trivial for prompt adjudication.
8. Promotions, wage changes, and disciplinary action should always be approved by the officer immediately superior to the one directly responsible.
9. No officer or employee should ever be required, or expected, to be at the same time an assistant to, and critic of, another.
10. Any officer whose work is subject to regular inspection should, whenever practicable, be given the assistance and facilities necessary to enable him to maintain an independent check of the quality of his work.

IDEAS FROM PRACTICAL MEN



Aligning Sprockets for Chain Drives

DON R. HAMMITT
Chief Engineer, Portland Forge & Foundry Company

VERY OFTEN good chain drives are ruined by improper installation. The following is a simple method of installing chain drives so that the shafts of the driving motors and those of the machines to be driven will be properly aligned and the chains will be square with the shafts.

After the machine to be driven has been leveled and secured in place, the sprocket should be put on the shaft and keyed. The motor should then be leveled and set so that its armature shaft is at the proper center distance from the shaft of the machine. The sprocket should then be keyed in place. The aligning and squaring operations should be begun by placing a straight-edge across the sprocket on the machine and well past the one on the motor, as shown in the illustration. The straight-edge will show at once whether or not the sprockets are approximately in line.

To check the alignment accurately, clamp a dial indicator on the motor sprocket, as shown. By revolving the armature shaft one-half turn while the straight-edge is kept firmly against the machine sprocket, the indicator will be brought into the position shown by the dotted lines. If the indicator registers the same in both positions, both sprockets will be in proper alignment. If the indicator registers differently in each position, the motor must be twisted until the registry is the same. The sprockets will then be in accurate alignment.

With the sprockets in line and the shafts at the proper center distance, the motor should be secured in place on its foundation.

The alignment should then be rechecked to see that it has not been disturbed in any way. The success of the job will depend upon the care exercised. A point to be watched very carefully is to see that the end play of the armature shaft is equally divided. This precaution, of course, refers to motors with bearings of the sleeve type. If the motor has ball bearings, there will be no end play.

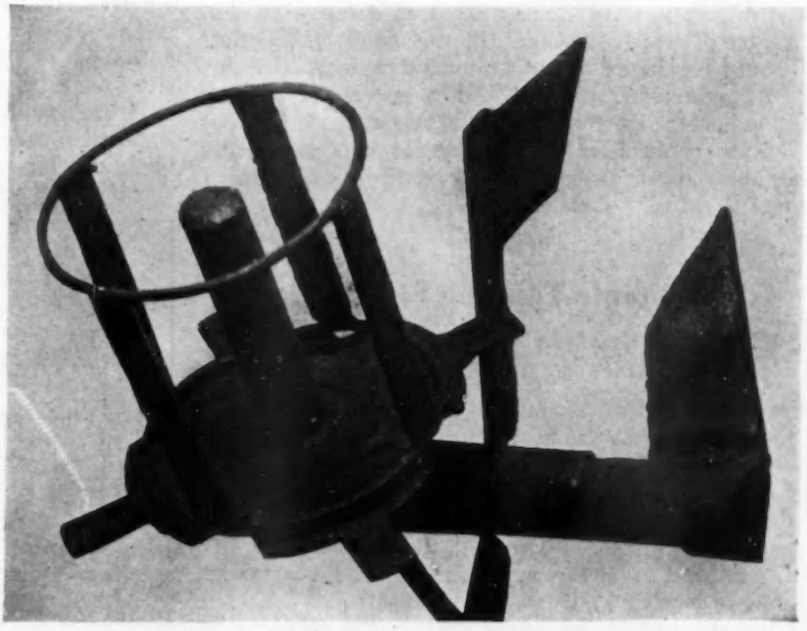
■

Welding Carburizing Pots

O. S. WALTERS
Manager, Garber Tool Company

We have found it economical to buy second-hand oil-well casing for making our carburizing and annealing pots. The casing is cut into proper lengths, and the bottoms are welded in.

The fixture for holding the pots was originated by



Fixture for holding carburizing pots while welding in the bottoms

the welder who does this work and made by him in his spare time. It is welded throughout, constructed entirely from pipe scraps and waste pieces.

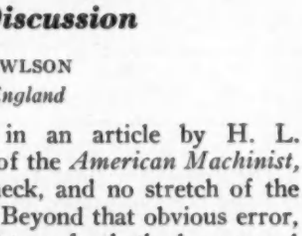
Two sizes of pots are made—10 and 12 in. in diameter, respectively. The revolving part of the fixture has a diameter of about 11 in., enabling the smaller pots to be slipped inside the rim, while the larger pots go on the outside. The welder can put a bottom completely in place without changing the position of his torch, the pot being revolved by turning the fixture by the short arms at the base by either the foot or the knee. The use of this simple device has effected a great economy in time in making the pots.

■

A Gooseneck Toolholder for the Shaper—*Discussion*

J. T. Towlson
London, England

The toolholder described in an article by H. L. Wheeler, on page 66, Vol. 72, of the *American Machinist*, is not by any means a gooseneck, and no stretch of the imagination can make it one. Beyond that obvious error, the toolholder is a most useful type for both shapers and planers. A true type of gooseneck tool is shown in the accompanying illustration.



I trust that Mr. Wheeler will pardon my criticism of his article, but he does not tell us why the toolholder he describes is superior to the straight variety, especially for some kinds of work. Held in such holders, the slightest tendency for the tool to dig in causes it to spring away from the cut. In ordinary tools and toolholders, this spring causes the cutting point to describe an arc, the center of which is behind the tool point. The effect is the digging in of the tool, sometimes increasing the cut to the breaking point. With a gooseneck tool, or with the holder described by Mr. Wheeler, the conditions are obviously different. If the set back is sufficiently great, the danger of breakage from the digging in of the tool is entirely obviated.

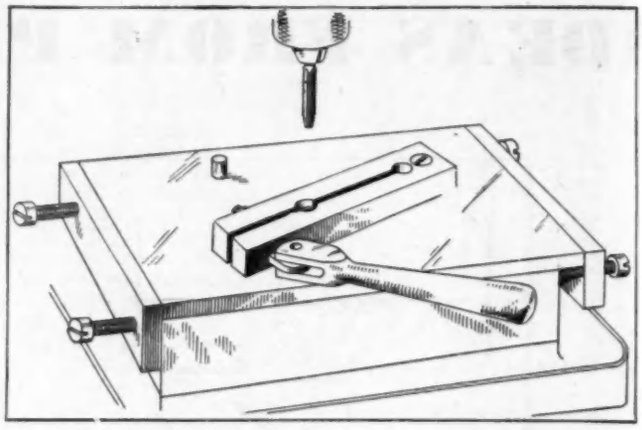
■

A Simple Tapping Fixture

Charles H. Willey
Asst. Plant Supt., Hoyt Electrical Works

For tapping all of our binding posts and similar work of round type, such as short studs and supports, we use the very simple fixture shown in the illustration and find that it has excellent holding qualities. The holding part of the fixture is made of tool steel and is split to give spring tension. Before being split, three holes are drilled in it, one for a pivot screw, one where the slit is to end, and one to receive the work.

A lug attached to one side is used for the pivot pin of a cam lever. The fixture can be adjusted in a horizontal



plane by rotating it upon the pivot screw. Adjustment longitudinally is accomplished by sliding the table top on which the holding fixture is pivoted, screws being provided to lock it. When once adjusted for a certain part, the table top is locked. A stop pin in the table top is used as an abutment for the holding fixture while the work is being clamped. After the work has been clamped, the holding fixture is rotated upon its pivot until the work is brought under the center line of the tap. Separate holding fixtures are used for different sizes of work.

■

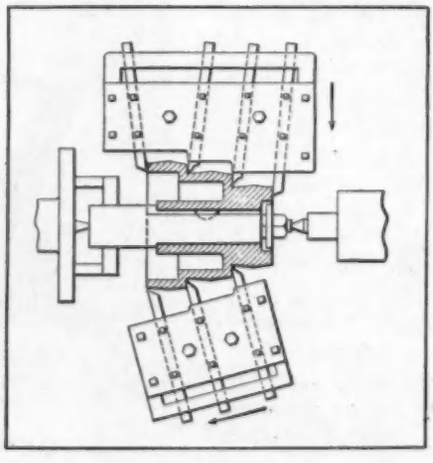
Multi-Cutting Tools

Charles R. Whitehouse
Chief Time-Study, The Holtzer-Cabot Company

Where many cone pulleys of a size are to be turned, it will pay to equip the lathe with such toolblocks as are shown in the illustration. The turning and the facing tools are mounted in separate blocks fitted to the bridge of the carriage, one block being in front of the work, while the other one is behind it. Both blocks are connected to the cross-feed screw, and are so spaced that when the tools in one are cutting, the tools in the other are free from the work.

The steps of the pulley are turned and crowned simultaneously by the tools in the front block, the taper attachment being used to guide the tools in crowning.

If the quantity of pulleys to be turned is great enough, a special forming block can be substituted for the regular taper attachment. Its use permits the steps to be turned and crowned without its being adjusted after the initial setting, whereas with the taper attachment, one setting is necessary for each pulley. If the special forming block is used, the pulleys should be mounted on a shouldered mandrel and should be brought against the shoulder, so that they will occupy the same relative



position to the tools. Since, due to the small variation in the size of the holes, the pulleys may not be tight enough on the mandrel to prevent them from slipping, a key should be provided for driving.

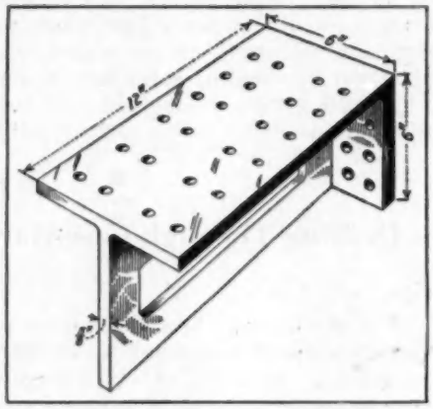
After the steps have been turned, the facing tools are brought forward, and the shoulders and both ends of the pulleys are faced. The facing tools can be operated either by hand or power. Any of the modern lathes are stiff enough to stand the punishment necessary in turning all the steps simultaneously.

■

A Time-Saving Angle Iron

H. L. Wheeler
Tool Designer, Engineering Division, U. S. Hoffman Machinery Corporation

Angle irons do not cost much, and they can be employed to advantage on a great variety of work in toolrooms and jobbing shops. The angle iron shown in the illustration is designed for use on planer, miller, shaper, or grinder, and has the advantage of being readily set up on any one of its six sides. It is made of cast iron, finished on all six sides, and is provided with a central web and a series of holes for bolts. By planing two such angle irons as a pair, they can both be used in a single setup, if necessary. The dimensions given in the illustration may be modified to suit conditions in the shop in which the angle iron is to be used. In the larger sizes, a rectangular hole is cored in the central web for lightness.



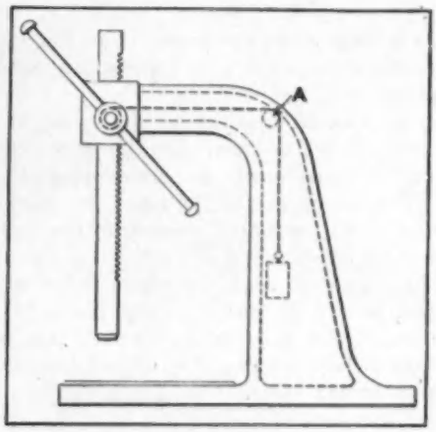
■

Automatic Return for Rams of Heavy Arbor Presses

Charles R. Whitehouse
Chief Time-Study, Holtzer-Cabot Electric Company

We have several heavy arbor presses in constant use and have found that the returning of the rams to their upper positions imposes considerable fatigue upon the operators. To make the work easier, we have put counterbalance weights on all the presses.

A hole was drilled and tapped in the pinion shaft of each press, and a hole was drilled through the frame, as at *A* in the illustration. A spool, such as wire is wound upon, was put on a shoulder bolt passing through the hole in the frame, allowing the spool to revolve freely. One end of a piece of narrow leather belting was attached to the pinion shaft by a screw in the hole drilled and tapped in it, and the belt was wrapped around the shaft one or more turns. The belt was then passed over the spool and a weight was attached to the free end.



When the operator pulls down on the lever, more of the belt is wrapped around the shaft, raising the weight. After pressing a mandrel in the work, the operator lets go of the lever, and the weight pulling down the belt, raises the ram to its upper position.

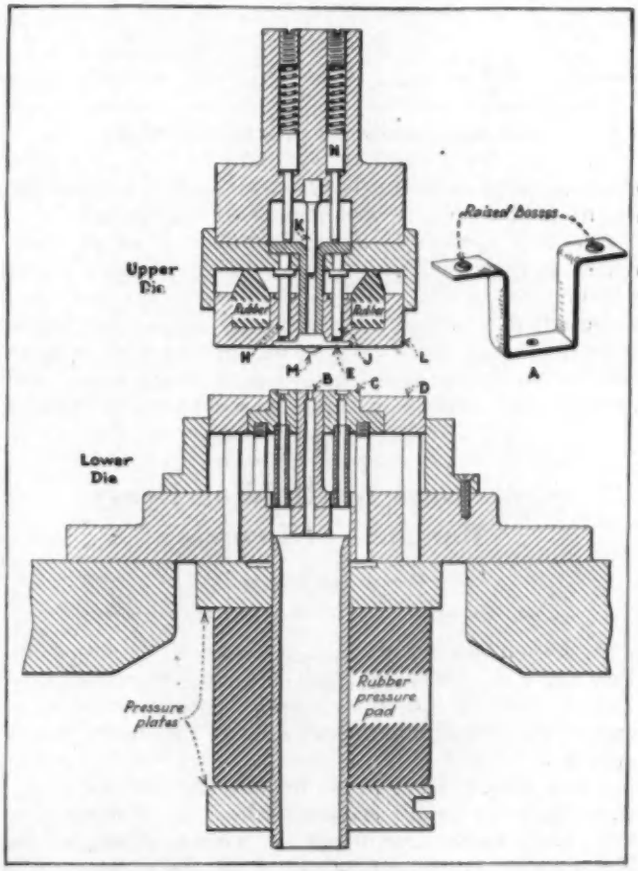
The added exertion of raising the weight when lowering the ram and pressing a mandrel into the work, does not appear to be felt by the operator. In fact, it is quite a saving in labor to have to operate the lever in one direction only.

■

Multiple-Operation Press Tools

Charles H. Willey
Asst. Plant Supt., Hoyt Electrical Works

The purpose of the tools illustrated below is to form the U-shaped part *A* from a flat strip of sheet brass, leaving the legs of the U rounded, and to pierce the three holes shown, forming bosses around the two holes



in the flat parts extending from the legs. The tools thus perform a number of operations at one stroke of the press.

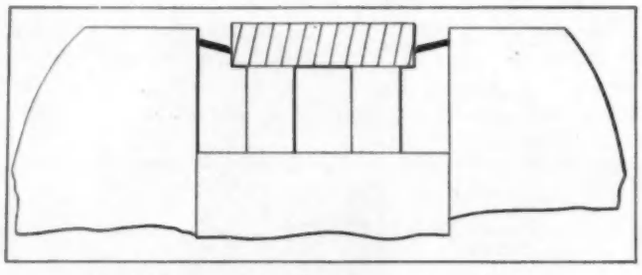
In operation, with the blank laid in a guide slot (not shown) in the lower die, the upper die descends, forming the part over the center plug *B* in the lower die. Upon the impact of the tools, the sections *C* and *D* move downward, section *C* coming to rest first. After the forming operation has been completed, the work is trimmed by the edges *E* and the three holes are pierced by the punches *H*, *J*, and *K*. The section *L*, being held down by a rubber pad, moves upward just before the completion of the downward stroke of the ram, being guided by pins at *M*. As the ram commences to move upward, the rubber pad, in connection with the stripper pins *N* and their springs, strips the work from the punches.

■

Hacksaw Blades and Some of Their Uses—*Discussion*

JOHN O. YOUNGWIRTH

Reading the article by Wm. S. Rowell, under the title given above, on page 536, Vol. 72, of the *American Machinist*, reminded me that I have found another use for discarded hacksaw blades. The difficulty of holding



Hold-downs improvised from hacksaw blades

pieces securely on parallels in machine vises, without the use of hold-downs, is well known to machinists.

For such machinists as do not have a set of hold-downs in their kits, pieces of worn-out hacksaw blades will do just as well. The illustration shows how they are used, the toothed edge being set against the work. It is surprising how heavy a cut can be taken on work held by these improvised hold-downs, which insure that the top of the work is machined parallel with the bottom.

■

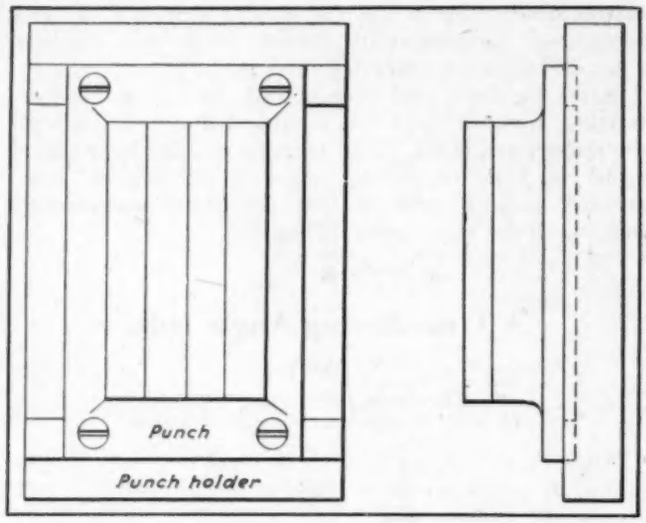
Cross-Keys for Holding Heavy Punches—*Discussion*

WILLIAM C. BETZ

Chief Engineer, The Fafnir Bearing Company

Articles under the title given above, by Ernest Foldvary and F. C. Twist, on pages 194 and 538, respectively, Vol. 72, of the *American Machinist*, remind me of an experience in machining punch holders for holding heavy punches.

After having tried keys, dowels, and screws of various kinds to hold a shearing punch from slipping on the punch holder, we tried the scheme shown in the illustration. Cross cuts about $\frac{1}{4}$ in. deep were taken near the ends of the punch holder, which was afterward



planed lengthwise to the finished width of the punch and to the same depth as that of the cross planing, leaving a pocket in the center. The punch was then planed so that it fitted nicely in the pocket, without side or end play, and was held in position by screws.

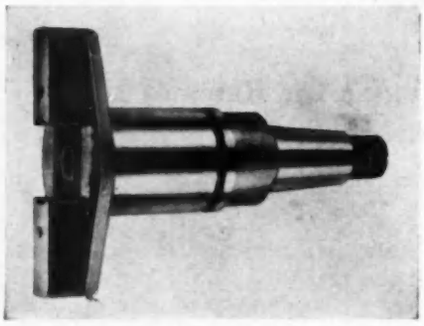
The advantage of this method lay in the fact that there was no fussy laying out nor milling of keys.

■

Drilling Through Case-Hardened Steel

G. G. KERR

The photograph shows an engine part that was heat-treated to give a case of about 90 Shore scleroscope hardness. The parts, of which there were several, were completely finish ground before it was discovered that two holes had been forgotten. We laid out the holes on each side of the pieces using a tungsten-carbide tipped height gage scriber. We then tipped a piece of $\frac{3}{16}$ in. drill rod with tungsten carbide and ground it to make a three-cornered drill, located the point at the intersection of the lines, and drilled through the case on each side of the pieces.



A tungsten-carbide drill was used to correct the omission of oil holes

An ordinary high-speed steel drill was used to remove the material that was not hardened. This left the holes countersunk on each side, but as they were only for oil, great accuracy was not required. If accuracy had been required, we could have made a cheap jig, welded a tungsten carbide tip to a twist drill, and ground it to size, as we have done work of this kind before.

▼

Pins driven into rivet holes should be struck lightly until seated. This manner of starting eliminates the tendency of pins to fly out at the first blow.

Measurement Conversion Tables

English and Metric Factors

U. S. System to Metric System

Pounds per lineal foot	×	1.488	= kilos. per lineal metre
Pounds per lineal yard	×	0.496	= kilos. per lineal metre
Tons per lineal foot	×	3333.33	= kilos. per lineal metre
Tons per lineal yard	×	1111.11	= kilos. per lineal metre
Pounds per mile	×	0.2818	= kilos. per kilometre
Pounds per square inch	×	0.0703	= kilos. per square centimetre
Tons per square inch	×	1.575	= kilos. per square millimetre
Pounds per square foot	×	4.883	= kilos. per square metre
Tons per square foot	×	10.936	= tonnes per square metre
Tons per square yard	×	1.215	= tonnes per square metre
Pounds per cubic yard	×	0.5933	= kilos. per cubic metre
Pounds per cubic foot	×	16.020	= kilos. per cubic metre
Tons per cubic yard	×	1.329	= tonnes per cubic metre
Grains per U. S. gallon (3.785 litres)	×	0.017093	= grammes per litre
Pounds (avoir.) per U. S. gallon (3.785 litres)	×	0.11955	= kilos. per litre
U. S. gallons (3.785 litres) per square feet	×	40.742	= litres per square metre
Foot-pounds	×	0.1382	= kilogrammetres
Foot-tons	×	0.323	= tonne-metres
Horsepower	×	1.0139	= force de cheval
Pounds per H. P.	×	0.477	= kilos. per cheval
Square feet per H. P.	×	0.0196	= square metre per cheval
Cubic feet per H. P.	×	0.0279	= cubic metre per cheval
Heat units (B. T. U.)	×	0.252	= calories
Heat units (B. T. U.) per square foot	×	2.713	= calories per square metre

Metric System to U. S. System

Kilos. per lineal metre	×	0.672	= pounds per lineal foot
Kilos. per lineal metre	×	2.016	= pounds per lineal yard
Kilos. per lineal metre	×	0.0003	= tons per lineal foot
Kilos. per lineal metre	×	0.0009	= tons per lineal yard
Kilos. per kilometre	×	3.548	= pounds per mile
Kilos. per square centimetre	×	4.223	= pounds per square inch
Kilos. per square millimetre	×	0.635	= tons per square inch
Kilos. per square metre	×	0.2048	= pounds per square foot
Tonnes per square metre	×	0.0914	= tons per square foot
Tonnes per square metre	×	0.823	= tons per square yard
Kilos. per cubic metre	×	1.686	= pounds per cubic yard
Kilos. per cubic metre	×	0.0624	= pounds per cubic foot
Tonnes per cubic metre	×	0.752	= tons per cubic yard
Grammes per litre	×	58.4139	= grains per U. S. gallon (3.785 litres)
Kilos. per litre	×	8.3459	= Pounds (avoir.) per U.S. gallon (3.785 litres)
Litres per square metre	×	0.02453	= U. S. gallons (3.785 litre) per square feet
Kilogrammetres	×	7.233	= foot-pounds
Tonne-metres	×	3.088	= foot-tons
Force de cheval	×	0.9863	= horse-power
Kilos. per cheval	×	2.235	= pounds per H. P.
Square metre per cheval	×	10.913	= square foot per H. P.
Cubic metre per cheval	×	35.806	= cubic feet per H. P.
Calories	×	3.968	= heat units. (B. T. U.)
Calories per square metre	×	0.369	= heat units (B. T. U.) per square foot

Courtesy of the Heppenstall Company

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American Machinist

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

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VOL. 73 NO. 1

Beginning Volume 73

THIS number marks the beginning of the seventy-third volume of *American Machinist*. Founded fifty-three years ago by Horace B. Miller, with Jackson Bailey as its first editor, it has continued under the same name ever since. It has been edited by Frank F. Hemenway, Fred J. Miller, Frederick A. Halsey, Leon P. Alford, John H. VanDeventer, and Ethan Viall, in that order.

The present editorial staff, headed by Kenneth H. Condit and Fred H. Colvin, consists of S. Ashton Hand, Frank J. Oliver, Jr., George S. Brady, H. R. LeGrand, Chester B. Lord, Herbert Chase, E. J. Tangerman, C. G. Smith, William W. Dodge, and John Haydock, Jr.

Name the Job

THE War Department has requested the American Standards Association to consider the subject of nomenclature of occupations. Various authorities who have been asked for advice on the desirability of undertaking the project, although they are generally favorable, emphasize the extreme difficulty of the task.

Naming the jobs is one thing, defining them is quite another. If the A.S.A. can accomplish both it will have done something to boast about. Success may even pave the way to a solution of union labor jurisdictional squabbles.

Grinding Costs Demand Reduction

ACCORDING to a production executive in a prominent plant building a high-grade automobile, about half the total machining cost of the product is for grinding and polishing operations, most of which are non-automatic.

This surprising statement indicates the rapidly increasing importance of grinding and polishing machines in modern production plants. The grinding of flat, spherical, and cylindrical surfaces has been developed to a high degree, so far as accurate sizing is concerned; but relatively few such machines are fully automatic, and even the number of semi-automatic machines is not large.

Although enormous sums are spent annually in grinding and polishing irregularly shaped surfaces such as automobile radiator shells and bumpers, nearly all this class of work, perhaps because extremely close limits are not essential, depends upon guiding the work by hand. One manufacturer is using some semi-automatic machines for grinding high-chromium steel radiator shells, but they are rather cumbersome affairs and considerable hand grinding still is required.

Great possibilities as well as many difficult problems undoubtedly confront the designer who seeks to reduce grinding costs by the use of automatic machines; but the rewards to be gained warrant careful study.

The New Apprenticeship

SIGNIFICANT of our changing viewpoint is a statement on apprenticeship in the Fiftieth Anniversary booklet of Warner and Swasey. The statement is that in the old days apprentices were trained to be mechanics, while today they are trained to be executives.

It is indeed a far cry from the period when apprenticeship meant the meanest kind of drudgery, with very little honest education of any sort, to the present day when the relative proportions of education and drudgery have been reversed. The simpler business organizations of the past relied on skilled labor and had need of but few executives. Now, we need at least as many skilled workers, but our enterprises are so much greater that the highly skilled men seem to be relatively few. They are surrounded by unskilled workers for whom there would have been no place in the old shop, but who can now be taught to feed and operate highly perfected machines.

The presence of these workers of limited skill demands supervision far more extensive and of higher grade than was needed of old. College-trained engineers and academic graduates are not being turned out fast enough to meet the needs of industry, and we must therefore turn to the modern type of apprentice school. One has but to scan the ranks of executives in industry today to see what the future holds for the apprentice.

SHOP EQUIPMENT NEWS

Moline No. 11 Hydraulic Lapping Machine

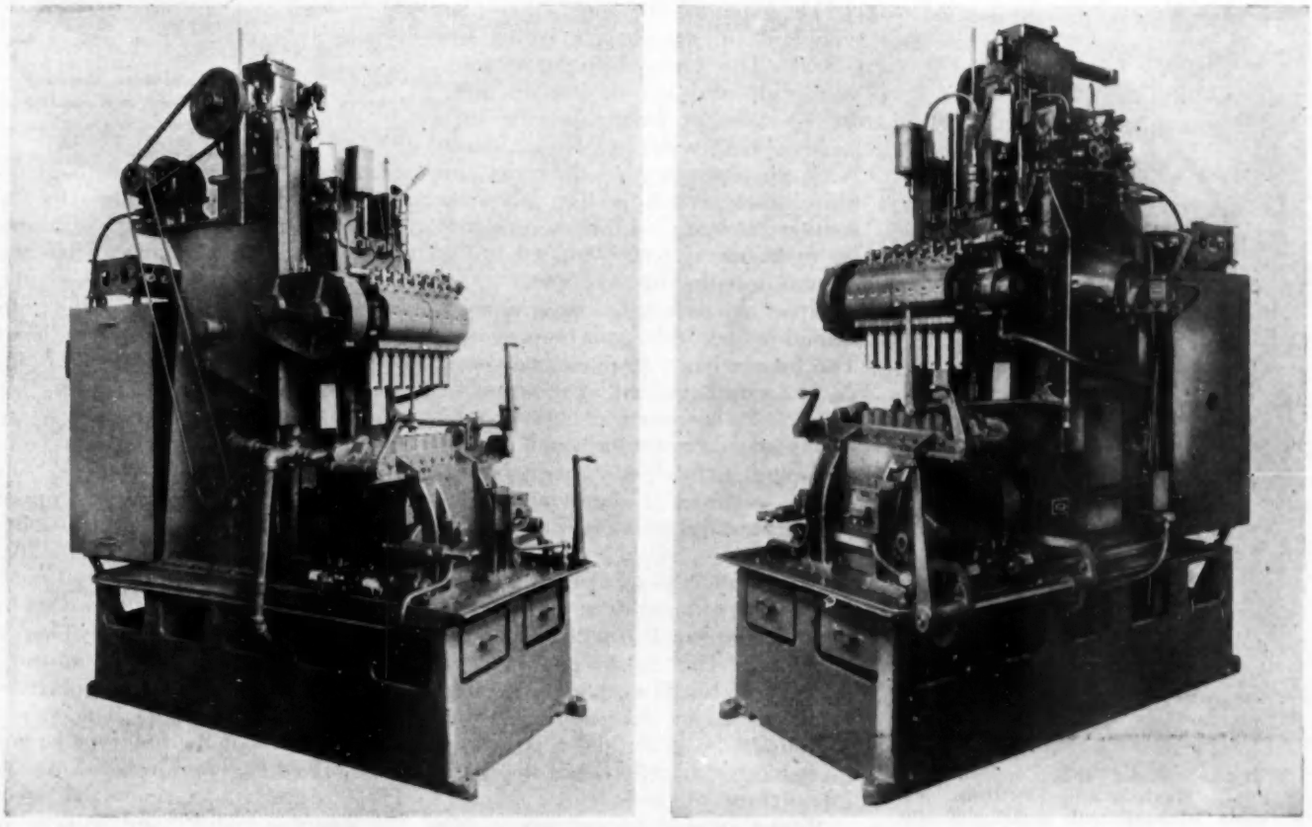
FOR lapping cylinder blocks, the Moline Tool Company, Moline, Ill., has added the No. 11 hydraulic lapper with electric braking motor to its line. One of the features of this machine is the special type of main drive used for the spindles. After the reciprocating rail has completed a predetermined number of strokes, and at the instant it reaches the top of the withdrawal stroke out of the cylinder, a switch is tripped automatically. This reverses the main driving motor, causing it to exert a braking action to bring the motor and consequently the spindles to a stop. At the instant the motor stops, another switch shuts off the current automatically, preventing the motor from running in the reverse direction. The hones, in case they are not of the type that can be adjusted while the spindles are rotating, can then be adjusted for stone wear.

The main driving motor is located inside the column and, by means of an inclosed silent chain at the left side of the machine, drives an intermediate shaft on the rail. Speed change gears are inclosed in the gear case at the left end of the rail to transmit the power from the intermediate shaft to the long spiral. The latter in turn drives the spindles through the spiral gears. Ball and roller bearings are used throughout the drive to the spindles.

A push-button control for the main driving motor is located conveniently on the front right-hand corner of the jig. This control station is of the totally inclosed type to prevent the kerosene from entering and causing an electrical hazard. As stated, the rotation of the spindles is stopped automatically at the end of each cycle, but by means of the push-button control, they may be started or stopped at any part of the cycle. An inclosed reversing panel and a resistor, both for the main driving motor, are mounted at the back side of the column.

The Oilgear pump for reciprocating the rail is located on top of the column and is driven by a separate motor. Another push-button control of the totally inclosed type is provided for the small Oilgear pump motor. It is located conveniently on the front left-hand corner of the jig, whereas the main driving motor push-button is located at the right hand.

Reciprocation of the hone stops automatically when the rail reaches the top of the withdrawal stroke, but by means of a hand lever located on top of the jig, reciprocation may be stopped at any time. For example, if it is desired to do corrective lapping, the hones can be stopped from



Moline No. 11 Hydraulic Lapping Machine equipped with a braking type electric motor to stop the spindles. By a lever at the right-hand side of the jig, a cylinder block is raised clear of the locating pins

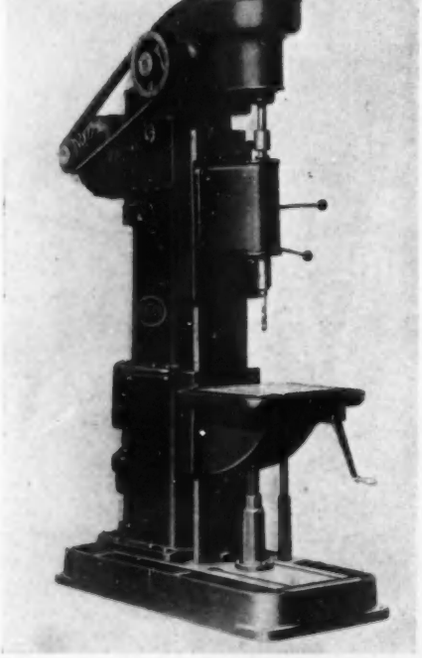
reciprocating at any part of the stroke and allowed to rotate in any part of the bore.

The entire reciprocating rail assembly has a one-shot lubricating system. To facilitate moving the cylinder block in and out of the holding fixture, rollers are provided, which are arranged so that, by raising a lever at the right hand end of the jig, the cylinder block is raised off of the hardened steel rest pads.

The centrifugal pump which supplies the kerosene for the hones is located in the left side of the column, and is driven by the main driving motor. Consequently, when this motor is stopped at the completion of a cylinder block, the kerosene supply is also stopped. The tank is provided with two settling pans and five settling compartments, insuring the kerosene being free of grit when it is pumped to the hones.

"Natco" Model B-225H Hydraulic-Feed Single-Spindle Drilling Machine

Semi-automatic hydraulic feed with a simplified control of the head is featured on the "Natco" Model B-225-H, single-spindle drilling machine announced by The National Automatic Tool Company, Richmond, Ind. The machine is arranged with a flat slide especially for the mounting of either single- or multiple-spindle drillheads. The purpose of the machine is to provide a means for increasing production where the purchase of multiple or special equipment is often considered to be inadvisable



"Natco" Model B-225H, Hydraulic-Feed, Single-Spindle Drilling Machine arranged with a flat slide for the mounting of either single- or multiple-spindle drillheads

The base is deep and ribbed both lengthwise and crosswise to obtain rigidity. The working surface is 17½ in. long by 17 in. wide, extending to the front edge of the base and provided with T-slots for clamping fixtures. A wide channel at both sides and across the back of the base forms an open reservoir of ample capacity for the coolant compound. Provision has been made on the rear for the mounting of a large gusher pump.

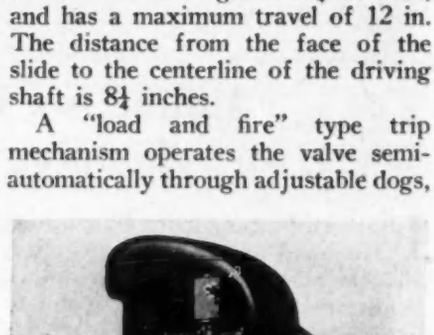
The column is of the box-section type built in two halves bolted together. The ways which support the head slide and the adjustable table are 10 in. wide, having bearing surfaces 2½ in. wide by 1¼ in. deep. A large opening in the rear of the column permits adding auxiliary counterweights. An oil reservoir for the hydraulic system is located in the column near the top.

Either an adjustable knee type or a solid built-in table can be provided. The former has a minimum height of 22 in., with a vertical adjustment of 12 in. It is raised or lowered by means of a removable crank. The working surface of the table is 16x16 in. and is surrounded by a lubricant channel. T-slots are provided.

One single casting forms the lower half of the column, base, and table of the machine supplied with solid built-in table. The working surface is 22 in. long by 20 in. wide and has a height of 22 in. A coolant channel surrounds the table, and a large chip pit is located directly below the working surface.

Either single- or multiple-spindle heads can be mounted on the slide, which is 22 in. long and 14¼ in. wide, and has a maximum travel of 12 in. The distance from the face of the slide to the centerline of the driving shaft is 8¼ inches.

A "load and fire" type trip mechanism operates the valve semi-automatically through adjustable dogs,



Rear view of the machine, showing various grouped controls and coolant arrangements

which cause the head to go through its cycle of rapid traverse down to the work, feed for the drilling operation, rapid traverse up and away from the work, and stop at the end of the stroke, the operator only having to start the cycle by means of a hand lever. A second control lever is located near the starting lever for emergency stopping purposes or to change the control mechanism from semi-automatic to hand control. The movement of the head may be stopped at any time during the cycle by operating this second lever. After that the operator can move the head independent of the automatic trip dogs by means of the first lever. This is especially valuable when setting up.

Hydraulic pressure is supplied by a constant-volume pump. The operating cylinder is of the pull type having a total feeding pressure of 3,400 lb. The hydraulic operating valve is of the balanced-piston type and is located above the oil reservoir. All

piping is concealed within the column and neck.

A 5-hp., ball-bearing motor of the open-frame type furnishes the drive. It is mounted on the column near the top at the rear of the machine. The first speed reduction is made from the motor to the neck by a multiple V-belt drive, the second by a pair of hardened, alloy-steel, spiral-bevel gears, and the next two speed reductions through hardened, alloy-steel, pick-off gears. The last permit a range of spindle speeds from 100 to 1,300 r.p.m. Any one speed within the range of the machine may be furnished. Extra change gears may also be had.

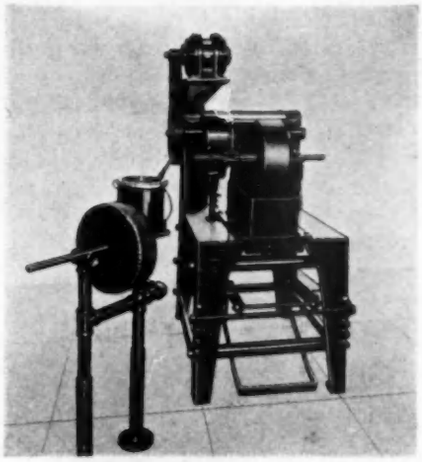
A cascade lubricating system furnishes lubrication in the neck at all times. The coolant system includes a Ruthman (gusher) centrifugal pump of 10 gal. per min. capacity and piping to a shut-off valve on the side of the column. From the shut-off valve to the table is furnished a flexible hose and nozzle, which can be adjusted for direction of the coolant flow.

Complete electrical equipment wired ready for operation is furnished on this machine. It is suitable for 440- and 220-volt, 60 cycle, 3-phase circuits.

Specifications: Height of machine, 7 ft. 11 in.; center of driving shaft to face of column, 10 in.; height of working surface of adjustable table, maximum, 34 in., minimum, 22 in.; height of working surface of base, 6 in.; height of working surface of solid built-in table, 22 in.; travel of head slide, maximum, 12 in.; height of bottom of head slide above working surface of base, maximum, 44 in.; minimum, 32 in.; diameter of spindle, 2¼ in.; Morse Taper, No. 4; distance from working surface of base to spindle nose, maximum, 46 in., minimum, 34 in.; range of power feed, 0 to 15 in. per min.; rapid traverse, 95 in. per min.; floor space, 26x50 in.; weight, 3,650 lb. net., and drilling capacity, 1¼ in. in steel at 75 ft. per min. and 0.008-in. feed per revolution.

"General" Polishing Wheel Set-Up Machine

For coating polishing wheels with a new surface of abrasive grain, the General Spring Bumper Corporation, Detroit, Mich., is offering the machine illustrated. The operator puts the wheels to be prepared on the arbor, which is placed on the gluing stand close to the machine. The wheel is turned slowly while the glue is applied and then snapped into the spring clutches on the rocker arms, the switch turned on, and the wheel pounded into the warm emery until an even, tough coating is obtained. While the machine is running, the operator glues another wheel, thus obtaining a high rate of production.



Savings in production and more uniform coating of polishing wheels with abrasive grain are features of the "General" Polishing-Wheel Set-Up Machine

The emery is distributed evenly and to a maximum depth. It is claimed that machine-prepared wheels have more than 20 per cent increased productivity over hand-prepared wheels and show over 60 per cent saving in direct labor costs of preparation.

Power from a ¾-hp. motor is transmitted through a gear and specially designed crankshaft to a pair of rocker arms on the coating machine. These rocker arms are supported by a vertical connecting rod and are provided with spring clutches to receive the arbor on which the wheel to be coated is placed. Directly below this mounting is the pan, usually 25 in. long, 9½ in. wide, and 8 in. deep, containing the abrasive. A steam-heated section maintains the emery at the correct temperature.

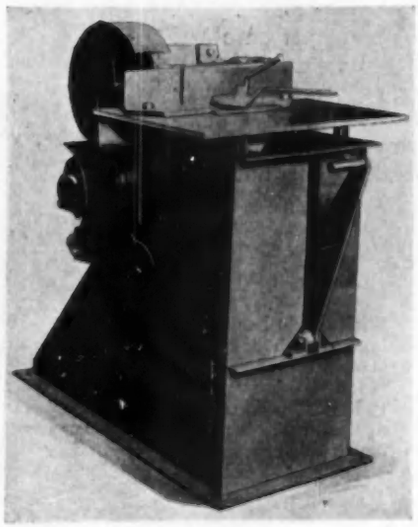
On starting the machine the crankshaft forces the rocker arms in a horizontal direction, but the vertical connecting rods, which are held laterally by adjusting arms at the lower ends, convert this horizontal motion into an elliptical orbit, thus giving the rolling and pounding action desirable in setting up polishing wheels. The impact is governed by adjustable collars on the connecting rods, but an additional adjustment is available by a pedal operated by the adjusting arms. This pedal serves dual purposes: the operator can lift up the rocker arms to a position for easy removal of the wheels; or, by using the pedal and relocating a shaft running across the front of the machine, various sizes of wheels may be set up varying from 5 to 20 in. in diameter and up to 7 in. in width.

This machine occupies floor space of 30x40 in., with a height of 60 in., and weighs 1,150 lb., exclusive of the motor.

Ryerson No. 00 High-Speed Cut-Off Saw

The No. 00 high-speed cut-off saw offered by Joseph T. Ryerson & Son, Inc., 16th & Rockwell Sts., Chicago, Ill., is now the smallest machine of the line. It is suitable for cutting light-gage steel moldings and small shapes of non-ferrous material such as brass, copper, and aluminum. Solid steel sections from ¼ to ⅜ in. round or square can be cut with the regular toothed blade. Sections slightly larger can be cut with the abrasive disk. Any aluminum or brass sections that will fit into the work table can be cut quickly and easily.

No water or other coolant is required in the operation of the machine. The entire unit is built into



Light-gage steel moldings and small non-ferrous shapes may be cut on the Ryerson No. 00 High-Speed Saw

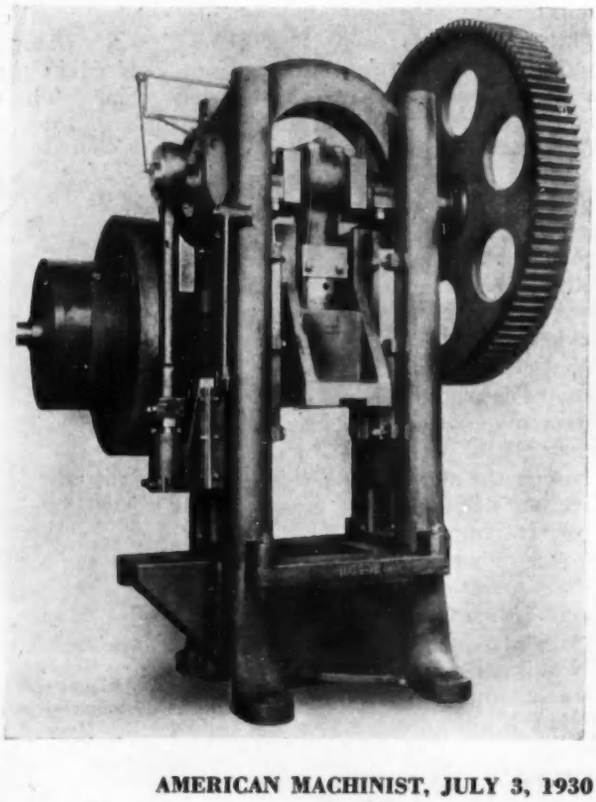
a sturdy frame of welded structural steel. The blade is mounted on an arbor carried by two heavy, double-row self-aligning, ball bearings and driven by a triple V-belt and 3-hp. motor.

Adjustment up and down is provided for the table to obtain the most efficient cutting conditions for the blade. A convenient quick operating clamp is provided. A hand lever eccentric moves the rear barrier toward the front, holding the stock tight against the front barrier. The entire clamp may be set to fit any angle up to 45 deg. for miter cutting. Guards completely inclose the blade and the V-belt drive.

Zeh & Hahnemann No. 9-16 Straight-Sided Power Press

No outboard bearing is required on the No. 9-16 straight-sided power press announced by the Zeh & Hahnemann Company, 182-200 Vanderpool St., Newark, N. J. This addition to the line is of built-up, tie-rod construction and the large driving gear is located close to the frame so that the above feature can be obtained. This in turn gives free access to the jaw clutch, which can be inspected or dismantled without interfering with any other parts of the machine.

The press as shown includes a side shear attachment and has central lubrication. The brake can be adjusted from the operator's position. A normal pressure of 250 tons can be exerted. When single back gearing is employed, the weight is 37,000 lb., and the rate of operation is 30 strokes per minute. The distance between the uprights is 30 in., and the standard stroke is 6 in. Roller bearings carry the backgear shaft.



With single back gearing the Zeh & Hahnemann No. 9-16 Straight-Sided Power Press yields 30, 6-in. strokes per minute. The distance between the uprights is 30 inches

Rickert-Shafer Special Type "C" Close-to Shoulder Diehead

A special model "C" diehead adapted to close-to-shoulder threading has been developed by the Rickert-Shafer Company, Erie, Pa. In general the tool has the features of the original model "C" described on p. 894, Vol. 72, of the *American Machinist*. This diehead is illustrated in Fig. 1. The other diehead, shown in Fig. 2, is also a special type designed to cut two diameters simultaneously on the end of a crankshaft. It is obvious that the threading time is cut in half by the use of this combination tool.

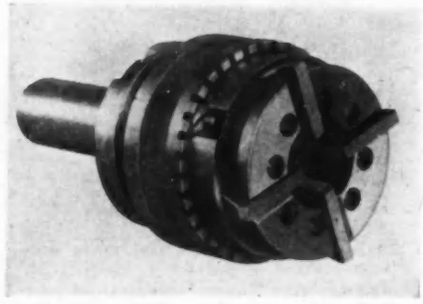


Fig. 1—Rickert-Shafer Special Type "C" Close-to-Shoulder Diehead

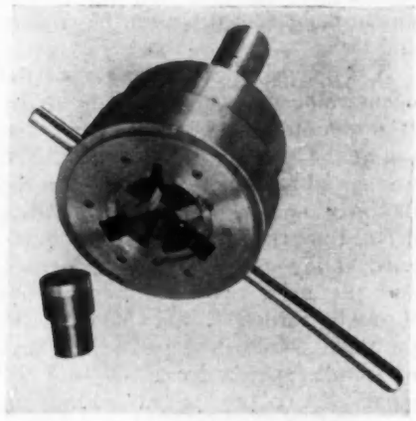
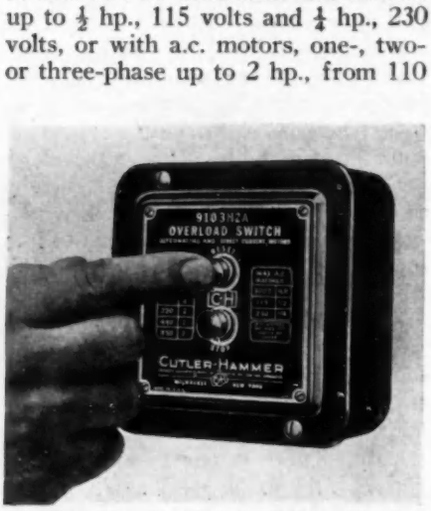


Fig. 2—Rickert-Shafer Special Combination Diehead for two diameters

Cutler-Hammer Starting Switch for Small Motors

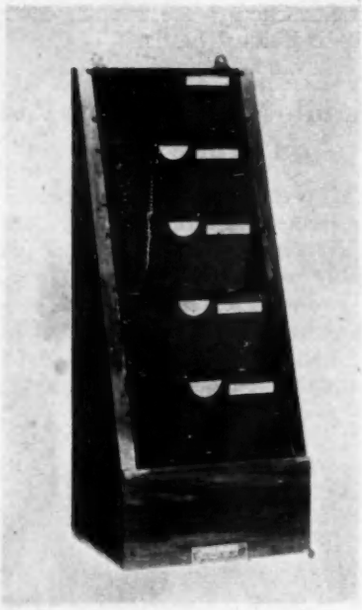
For convenient starting and stopping of small d.c. and polyphase motors, Cutler-Hammer, Inc., 80 12th Street, Milwaukee, Wis., is offering a Bulletin 9130, two-pole, push-button-operated starting switch with thermal overload relays. This switch can be used with d.c. motors up to ½ hp., 115 volts and ¼ hp., 230 volts, or with a.c. motors, one-, two- or three-phase up to 2 hp., from 110 to 550 volts. The device is small in size; the inclosing case is a standard wiring box so that the switch can be mounted on the machine. An open type switch for building directly into the machine at a convenient place is also offered.



Cutler-Hammer Bulletin 9103 Two-Pole, Push-Button Starting Switch

Hamilton Time Card Rack

A time card rack, designed by the cost accountant of the National Machine Tool Builders' Association, has been added to the line of the Hamilton Manufacturing Company, Two Rivers, Wis. It is for use with tabulating machines.



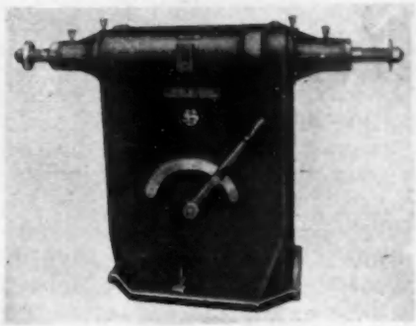
Hamilton Time Card Rack

The rack itself is 21⅞ in. high, 8$\frac{13}{16}$ in. wide, and 6⅝ in. deep. There are five tiers of time card compartments 3½ in. high in front, 12 in. high in back, and 8 in. wide. Compartment divisions are of 20-gage steel finished in black enamel, whereas the remainder of the rack is of varnished gumwood. Weight, 15 pounds.

"U. S." Model 95 Buffer and Polisher

Five sizes of the Model 95 buffer and polisher—1, 2, 3, 5, and 7½ hp.—are being manufactured by the United States Electrical Tool Company, Cincinnati, Ohio, in an improved design. The motors are capable of heavy-duty service. Four heavy-duty SKF ball bearings inclosed in dust-proof housings support the chrome-manganese steel spindle.

All buffers are equipped with remote control located in the base of the machine. The push-button station is conveniently located. Acme threads and bronze nuts are furnished on the spindle, the inner flanges of which are keyed to the shaft. A shaft holding device is furnished for use while changing wheels.



Improved form of "U.S." Model 95 Buffer and Polisher

Graton & Knight Tension Cemented Belting

A process of making cemented belting has been devised by the Graton & Knight Company, Worcester, Mass., in which by the use of a special machine double belting of great uniformity is produced at no increase in price. By the old methods the cement is applied by hand in one, two, or three applications, according to the cement used, and then clamped intermittently in a suitable press that can only cover a limited length of belt at each pressing. Even with the greatest care and skill, it is obviously impossible to secure complete uniformity in applying the cement or in clamping the two plies of the belt together.

By the present process a new type of cement is used which is applied uniformly and continuously in a machine in which a constant tension is maintained on the belt after being cemented. The difference between the results obtained is shown by pulling the plies apart in a testing machine in which the pull required is shown constantly on a large dial. Belts made by the improved method require at least twice the pull to separate the plies and are also more uniformly cemented. In addition, the belts are waterproof and resist friction or other heat to a much greater degree than belts made by the old method. They have a longer life and drive better on account of the increased flexibility. Less power consumption also results.

Shaffer-Watson-Stillman Hydraulic Crosshead-Pin Ejector

Prevention of upsetting, bending, or distorting of locomotive wrist pins is claimed for the Shaffer-Watson-Stillman hydraulic crosshead pin ejector by the Watson-Stillman Company, 75 West St., New York, N. Y. Although especially designed for removing crosshead pins, this pin ejector is adaptable to a variety of operations ordinarily done with a sledge, ram, or strong back. It simplifies the work of the shop mechanic, and is a self contained portable unit avoiding the necessity of getting rigging and miscellaneous gear together to do the job.

Two special hook rods are furnished, one shaped for the piston rod and one having double horns for gripping the connecting rod. The pump is of the single plunger type and is mounted upon a tank containing the operating fluid. A release valve is built into the body of the pump. The ram is provided with a rack and pinion device for moving it quickly up to the pin and for returning the ram to its back position. By means of the elevating screw and hand nut, the height of the cylinder and ram can be adjusted to suit the crosshead pin. Capacity of the device is 60 tons.

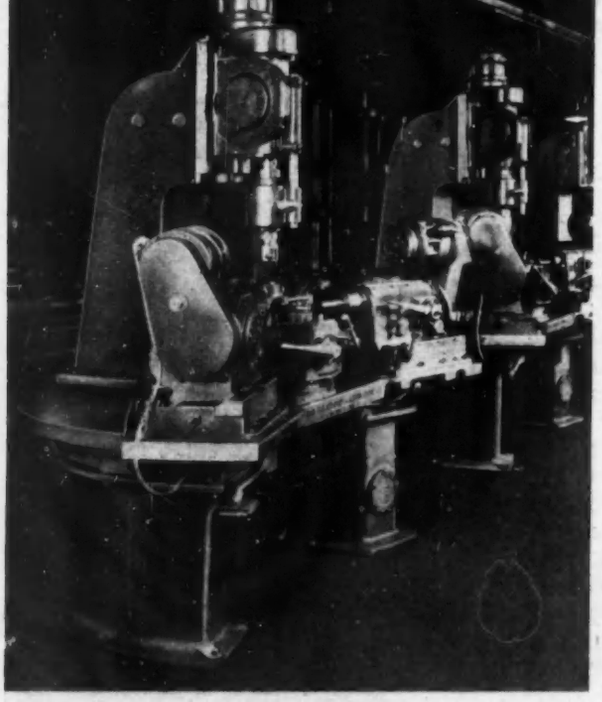
Upsetting, bending, or distorting of wrist pins is avoided by using the "Shaffer-Watson-Stillman" Hydraulic Crosshead-Pin Ejector

EQUIPMENT ADAPTATIONS

RECENTLY DEVELOPED BY THE MAKERS

Machining Front and Rear Brake Housing Hangers

The accompanying illustration shows a battery of machines developed by the Bradford Machine Tool Company, Cincinnati, Ohio, for performing two operations on the front and rear brake housing hangers used on an automobile, each machine being arranged for both the operations.



Battery of Bradford special machines for performing two progressive operations on front and rear brake housing hangers for an automobile

All elements of these machines such as the tables, pedestals, columns, and drilling or tapping units are standard, the units being assembled to meet the requirements of this particular installation.

The first operation on the two parts consists of drilling two $\frac{13}{32}$-in. holes, $1\frac{1}{8}$ in. deep at *A* and *C*, Fig. 2, with the horizontal units, and counterboring the hole *B*, with a combination tool with 1.123 and 0.600 in. diameters. These tools are operated at a cutting speed of 118 ft. per minute on malleable iron. Floor-to-floor time is 35 seconds each.

The second operation consists of reaming the holes *A* and *C* $\frac{1}{2}$ in. in diameter by $1\frac{1}{8}$ in. deep and tapping the hole *B* to $\frac{5}{8}$ in., 11 threads per inch. The reamers are operated at a cutting speed of 109 ft. per min. and the taps at 45 ft. per min. Floor-to-floor time is 24 seconds.

Each unit is equipped with individual motors having overload and underload protection. A central control is also provided which enables the entire machine to be started and stopped by means of a push button. A system for the distribution of cutting lubricant is also provided, operated by means of a commercial turbine-pump. One of the pedestals constitutes the tank for the storage of the cutting lubricant.

This operation requires the cutting tools to overlap each other in the same hole. Cams controlling the feed of the individual units are arranged to give an interlocking action on the holes. This necessitates a positive and accurate control of the feeding mechanism, which is obtained by means of a hand valve located at the right front of the machine. This valve connects an air cylinder atttached to the tripping levers of the individual heads.

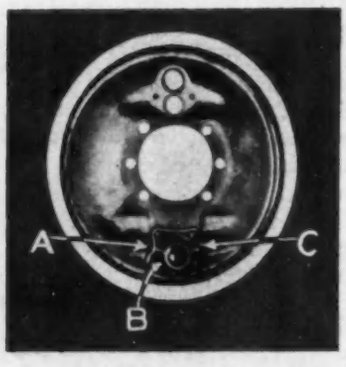


Fig. 2—Close-up of a front and rear brake housing hanger

Straddle Milling Pivots Pads on Brake Shoes

The pivot pads on the ends of brake shoes are straddle milled on a No. 2 standard manufacturing "Milwaukee" milling machine with a special two-spindle, vertical head built by the Kearney & Trecker Corporation, Milwaukee, Wis. Two semi-automatic air-clamping fixtures are provided, each holding one piece. The brake shoes are steel forgings, and two each of right-and left-hand $4\frac{1}{2}$-in. half-side mills are employed for cutting.

Pivot pads on the ends of brake shoes are milled at the rate of 780 pieces per hour with a special two-spindle vertical head

The inside spindle of the vertical head is securely bolted to the machine column and is supported by the double overarms. The outside head is clamped solidly to the double overarms and has a slight vertical adjustment to allow for cutter wear. It may also be adjusted along the double overarms, and has a micrometer screw for accurate setting.

Each fixture has a stationary base mounted on the knee of the milling machine. This base carries a reciprocating mechanism driven by a

Showing the pads which are straddle milled on this brake shoe, a steel forging

drum cam through gearing from the feed box. A brake shoe is slipped under the bar and dropped over the two pins in the fixture. This locates the shoes and they are clamped automatically by air as the table moves toward the cutters. As the clamp on one side tightens, the clamp on the opposite side loosens, permitting the operator to remove the finished workpiece and put in another while the first is in the cut, thus keeping the machine operating continuously.

When one shoe is milled the table stops, and all the operator has to do is to throw the lever, again engaging the feed, and the table feeds the other shoe into cutters. The feed lever is arranged so that the feed may be engaged quickly and conveniently from either side of the table.

Milling Hawkesworth Bits

Milling tapered slots and tongues on Hawkesworth bits made from steel forgings, as shown by Fig. 1, is a difficult milling job. A study of the part will show that nine different surfaces are milled at different angles. This work is done on the standard 18-in. "Duplex" automatic miller built by the Cincinnati Milling Machine Company, Cincinnati, Ohio, with the two standard spindle carriers replaced by two vertical carriers. Two special gangs of cutters are mounted on two special 1½-in. stub arbors provided with heavy lower supports.

A special universal fixture, capable of holding three different sizes of the bits by simply changing the locating strips, is mounted upon the inclined top of a 90-deg., hand-indexing base clamped to the table. There are four

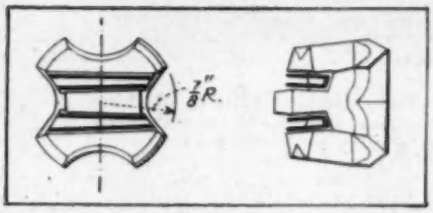


Fig. 1—Hawkesworth Bit which has nine different surfaces to be milled at different angles

stations on this universal fixture, and two pieces of work are held in each station, one above the other.

The cycle of operation is as follows: Engagement of table rapid traverse; dogs alongside of table engage feed automatically; taper slot and tongue are milled at one angle at station No. 2 by left-hand gang of cutters; the third station is idle; the taper slots and tongues previously milled at second station position are held in the fourth station and milled by the right-hand gang of cutters; rapid turn of table; stop; index base 90 deg., and repeat. It is obvious that the unloading and loading is done at station No. 1, which is nearest the operator.

A table feed of 3.52 in. per min. and a rotation of 26 r.p.m. give a time per piece of 0.44 min., and a production per hour of 119 pieces.

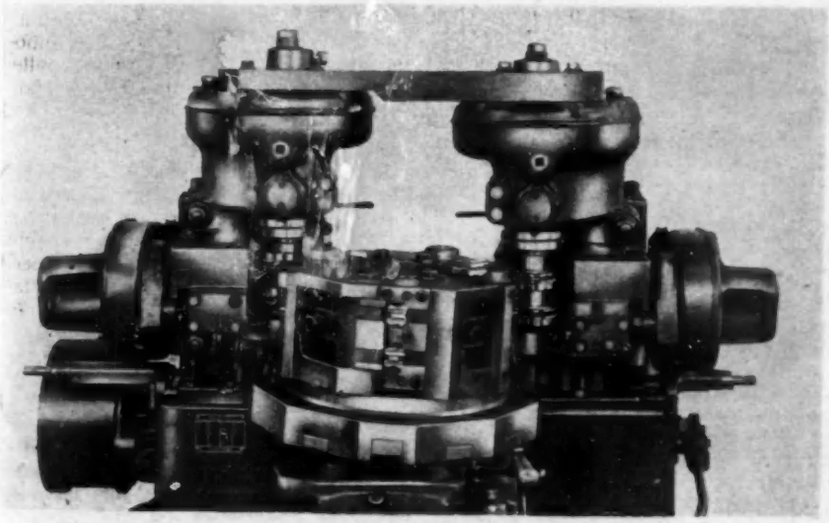
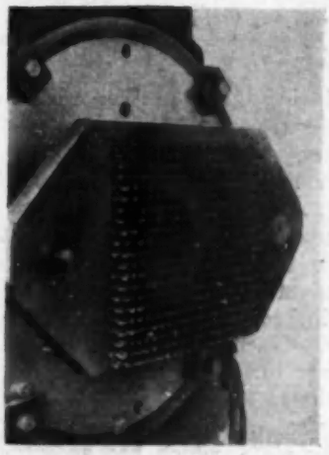


Fig. 2—Set-up of Cincinnati No. 18 Automatic Duplex Miller with two vertical spindle carriers and a special universal fixture having four stations for milling Hawkesworth forged steel bits

Langelier Horizontal Drill with 462 ¼-Inch Drills

A semi-automatic drilling machine carrying 462 ¼-in. drills has been built specially by the Langelier Manufacturing Company, Providence, R. I., for drilling "Celotex" boards. Since

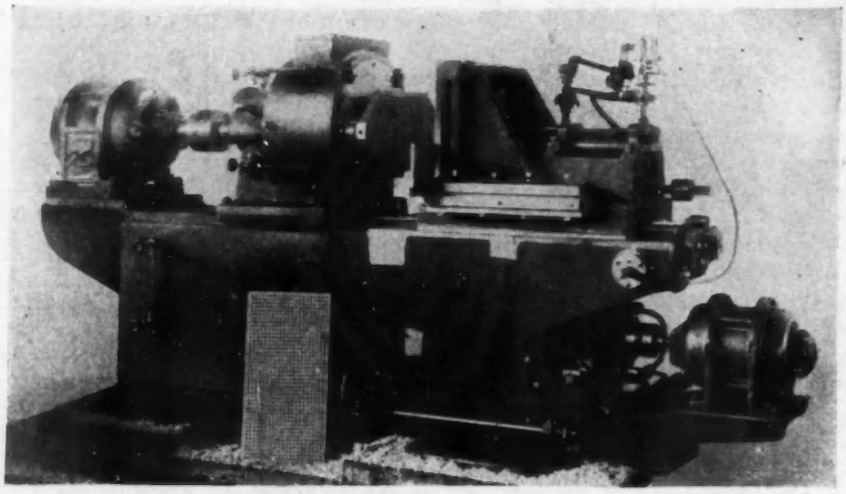


Close-up of arrangement of the 462 ¼-in. drills

the machine is semi-automatic in operation, the operator simply has to place the boards in position for drilling and take them out after the operation is complete. The drills revolve at 1,200 r.p.m., and drill at the rate of 21 in. per minute.

The main element consists of a multiple - spindle drilling head mounted in a fixed position on the left end of a horizontal cabinet bed. A feeding head hydraulically operated is mounted on a sub-saddle on the right end of the bed. Built-in Oilgear apparatus driven directly by a motor is bolted to the right end of the bed also, whereas a large capacity oil tank with a cooling coil is set into and bolted to the left front of the bed. Finally, a rotary oil pump driven directly by a motor is attached to the rear.

The spindles are placed in 21 horizontal rows 17/32 in. apart. Each row contains 22 spindles spaced



Special Langelier Semi-Automatic Multiple-Spindle Drilling Machine carrying 462, ¼-in. spindles for drilling "Celotex" boards. The spindle head has continuous oil circulation to carry away the heat

17/32 in. between centers, thus creating a rectangular group of 462 spindles. These spindles are of chrome-nickel alloy steel, heat-treated and ground, and are fitted with special eccentric lockpin collets. Each spindle runs on two hardened and ground steel-bushed bearings driven and locked in two large circular plates. Each spindle has two ball bearings for taking the thrust in both directions.

The spindles are crank driven by a driving plate, which has an integral trunnion mounted in a large radial ball bearing. The spindle crank driving plate is supported by and runs on eight large steady crank spindles running in turn on radial ball bearings. The head unit consists of three large circular plates separated by spacing rings and all doweled and held together by screws.

Because of the considerable amount of heat generated in the head, it is necessary to employ a 25-gal. oil pump to force oil up through the drilling head and out at the top and back into the tank. Part of the oil is diverted from the top down across the driving plate and flows out at the bottom into the tank. The oiling system insures the proper lubrication of the drilling head and keeps the running temperature at a low point. A cold water coil in the oil tank keeps the oil cool.

A spring-pressure, stripper push-plate mounted on the ends of the two pilot rods on each side of the drilling head is provided to press the Celotex boards against the feed and to hold them while the drills are withdrawn. The pilot rods are interconnected, thus avoiding cramping on boards of uneven thickness.

The feeding head has a total travel of 5 in., and is operated by a hydraulic cylinder bolted on top of the sub-saddle. Furthermore, the feeding head has a guide rail with an adjustable stop to facilitate sliding and locating the Celotex boards in position for drilling. The sub-saddle that carries the feeding head and its operating cylinder has a traverse of 24 in., and is operated by a screw and nut through a pair of spiral gears by crank. The Oilgear control is automatic in operation, in that it continuously reciprocates the feeding head.

Three motors on the machine are started by time relays to allow the oil to circulate throughout the head before it is started in motion.

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PATENT REVIEW

A head-traversing mechanism for radial drills is the subject of patent 1,731,466, assigned to The Cincinnati Bickford Tool Co. It relates to the interconnection of power and hand traversing means.

A swing-frame grinder, which permits adjustment of the grinding wheel axis when the wheel is out of balance, is covered by patent 1,734,003 assigned to the Norton Company.

The Norton Company was assigned patent 1,734,012 covering a grinding wheel unit composed of individual abrasive segments clamped to form a rigid unit.

TRADE PUBLICATIONS

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BISMUTH. The U. S. Department of Commerce, Bureau of Standards, has issued circular No. 382 on the first stages of an investigation to develop and extend the uses of bismuth and giving the progress. Copies are obtainable through the Superintendent of Documents, Washington, D. C., for $0.10.

CONVEYORS, FOR BULK MATERIAL. The Chain Belt Co., Milwaukee, Wis., has issued Catalog No. 202 on its "Rex" bulk material handling conveyors giving a complete description of elevators and conveyors of every type. The catalog gives 71 pages of descriptions, specifications, and installation views.

DRILLING MACHINES. Baker Brothers, Inc., Toledo, Ohio, have issued a loose-leaf binder containing several pamphlets on drilling machines of various types and keyseaters and slotters. A hydraulic feed boring and drilling machine is also mentioned. All items are thoroughly illustrated and described.

ELECTRIC TOOLS, PORTABLE. The Chicago Pneumatic Tool Co., 6 East 44th St., New York, N. Y., has issued catalog No. 898 entitled "CP Little Giant Electric Tools" for universal a.c., and d.c. applications.

MCGRAW-HILL BOOKS — 1930 CATALOG. McGraw-Hill Book Co., Inc., Penn Terminal Bldg., 370 Seventh Ave., New York, N. Y., has issued its 1930 Catalog on a very wide variety of engineering and scientific subjects.

MOTORS, INDUCTION. The Reliance Electric & Engineering Co., Ivanhoe Road, Cleveland, Ohio, has issued bulletin No. 107 on "Fully-Enclosed Fan-Cooled Induction Motors, Type AA, Form F, with ball bearings, for two- and three-phase a.c. circuits."

SPEED REDUCERS. The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has issued leaflet No. 20472 on the Types SH and DH speed reducers of the Westinghouse-Nuttall single- and double-reduction types. Information pertaining to horsepower ratings, speeds, dimensions, and weights is given in tabulated form, accompanied by outline drawings.

STEEL & ALLOY FOUNDRY STATISTICS. The Steel Founders' Society of America, Inc., 932 Graybar Bldg., 420 Lexington Ave., New York, N. Y., has issued a pamphlet "Statistics on the Steel & Alloy Foundry Industry—1929." This booklet also gives a condensed outline of the program of activities and the various committees.

NEWS OF THE WEEK

President Hoover Now Has the Facts—Trade Groups Dig into Distribution

PAUL WOOTON
Washington Correspondent

WASHINGTON, D. C., July 2.—In view of President Hoover's recent declarations, some of his critics may not have so much to say about his lack of courage. As a student of the experiences of other presidents he knows nothing is gained by baiting Congress, even if Congress baits him. He has not disturbed Congress while it was performing its legislative function, but when the time came for him to exercise his own constitutional responsibilities he spoke out in no uncertain terms.

Roosevelt withdrew from entry vast forest areas on the public domain and then signed the bill making it necessary for Congress to concur in such withdrawals. He got a big hand from the country but built up an opposition in Congress that prevented him from putting through most of the other items on his program. Mr. Hoover is not going to antagonize Congress when he can help it. The effect of that policy will be more apparent a year or two hence than it is at present.

During the first fifteen months of his administration Mr. Hoover was compelled to sit back and watch the other fellow score. It now is his inning and he already has brought in several runs.

A lot of fact-finding has been going on. With those facts in hand Mr. Hoover will not be slow to act, but he has refused to move until he had them.

There is less of the heroic in dealing with prohibition that does not prohibit and with farm relief that does not relieve than in organizing flood or famine relief, but all his friends ask is to wait until Mr. Hoover's inning is over. Many of the runs on which they are counting then will have crossed the home plate safely.

Apparently yielding under the pressure that has been brought to bear, the House Judiciary Committee has reported out the third Wagner unemployment bill. This measure authorizes the establishment of a national system of employment exchanges. Criticism of the committee's inactivity has been pouring in from the press, from labor circles, and from a group of opinion that believes some constructive steps should be taken to alleviate sufferings from unemployment in possible future depressions.

Colonel Charles H. Danforth's confirmation by the Senate as Assistant Chief of the Air Corps seems assured, his name having been favorably reported on by the Senate Military Affairs Committee. At present, Col. Danforth is in command of Selfridge Field. Entering the Air Corps in 1918, from the regular army, Col. Danforth graduated from Kelly Field, where he served as Executive Officer. Before going to Selfridge Field Col. Danforth was in command at Langley for three years, and was later Air Officer of the 4th Corps Area.

Linde

CUTTING COSTS BY WELDING

An "oxwelder" repairing a cracked flywheel without removing it from the machine—another way of cutting maintenance costs

With fond hopes pinned to the Capper-Kelly resale price maintenance bill, industrial and trade groups are exhibiting a tendency, noted particularly since the Federal Trade Commission's right-about-face in trade practice conference policy, to desert the tortuous corridors of the law relating to price-fixing and dig into distribution problems which do not bear directly upon commodity prices.

An inclination is apparent also to dispense with legal counsel in planning group activities for reducing the cost and improving the efficiency of operation of the distributive mechanism in particular trades. Trade groups so minded apparently believe that if, in carrying out such programs, they should run afoul of the anti-trust laws, the offense would be excused as not premeditated because investigation would show they acted without legal advice.

This would be an easy way out of the dilemma in which many trade groups are floundering but the mere fact that they did not have legal advice would not mitigate the offense that may be committed.

If the Capper-Kelly bill, which would enable manufacturers to maintain a fixed resale price for their products, has been instrumental in influencing them against approaching as closely as they dare to price-fixing by other means, it has had a wholesome effect, in the opinion of observers who differ widely on the economic merits of this legislation. The Kelly bill would not permit manufacturers to agree upon a horizontal level of prices but it would remove some of the competitive pressure forcing them towards such unlawful agreements by permitting them to establish individually a vertical and profitable system of prices.

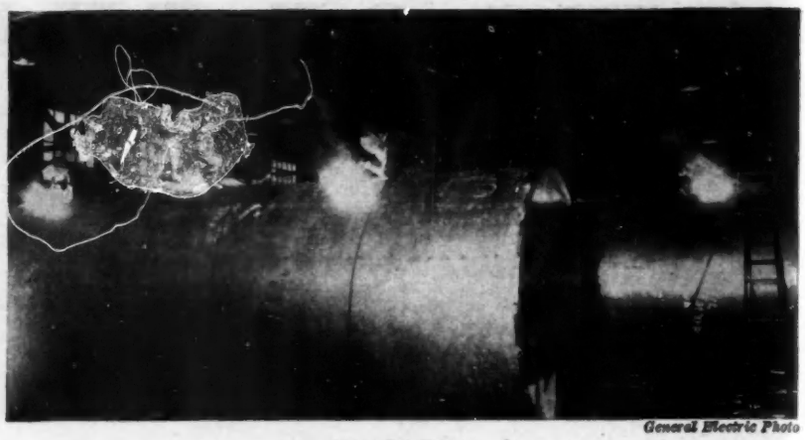
Although it remains unlawful for a manufacturer, by agreement, to fix his competitor's price, the Capper-Kelly bill

will enforce his right to fix his own price. That price may be any figure which he desires to set. Recognizing that the bill, theoretically, would permit the manufacturer to fix an extortionate price, Rep. Celler, of New York, has proposed an amendment providing that no price maintenance contract between the manufacturer and dealer shall be enforceable in the courts unless the manufacturer proves that his profit is reasonable. Regardless of the fate that this amendment meets in Congress, it is clearly unconstitutional. Because there is no test by which reasonableness of price can be determined, the U. S. Supreme Court declared that the Smith-Lever act to curb wartime profits was unworkable and hence, unconstitutional.

Some observers have the hunch that the success of the reparation loan will mark the turning point in the world situation. While some phases of the situation hardly could be worse, conditions are favorable to a rapid recovery. Despite the fact that Great Britain has been in the doldrums for a year, its production is continuing at last year's rate. Germany produced practically as much during the first half of 1930 as it did during the corresponding period of 1929. Even in the United States production is running close to the 1928 figures.

The British situation is more hopeful than at any time since the war, in the opinion of some observers, because they are taking care of one of the principal causes of their difficulties. Administrative inefficiency and the practices of the Victorian era are being attacked successfully. Individualism in the control of manufacturing plants is being succeeded by stronger units. There is some evidence that its mass of unemployment is becoming more fluid. There is a decided movement away from the tendency of the worker to follow his own trade or remain idle.

Everything, to the pictures on the wall, is included in the survey made by the Labor Department of the living standard of 100 select, if not elect, Detroit families supported by Henry Ford's minimum daily wage of $7. This information will be used by the International Labor Office at Geneva in computing, at Mr. Ford's request, the equivalent wage that the company would need to pay to place laborers in 17 European cities on the same general standard of comfort. Economists visualize in Mr. Ford's experiment a step toward establishing a world wage.



General Electric Photo

SPARKLERS

Not what it appears to be, but four welders in a fabricating shop are welding gasoline and oil storage tanks

Exports of United States well and refinery machinery during 1929 were the largest in the history of the industry, reaching a total value of $25,000,000, according to the Industrial Machinery Division, Department of Commerce. This trade was nearly two and one-half times that of 1925 and 54 per cent greater than the trade for 1928 of approximately $16,192,000.

Of this export volume, 36 per cent consisted of oil-well drilling machinery, 59 per cent "other oil-well and oil-refinery machinery," and 5 per cent "other well-drilling machinery." The value of each class of machinery exported was as follows: oil-well drilling machinery $9,060,575, other oil-well and oil refinery machinery $14,822,383, other well-drilling machinery $1,101,523. While part of the large demand for oil refinery machinery was due to the erection of new refineries, a considerable portion was destined for the improvement of existing installations.

French Industry Seeks Co-operation for Progression of Prosperity

Paris Correspondence

THE French industrial situation can be measured by conditions affecting the metallurgical and metal-working trades. One French critic points out, "pig-iron production is virtually the equal in volume of that of Great Britain or Germany, the supply being adequate, while the real problem is that of quality." What is doubtless meant is that the quantity of semi-products of quality is lacking and too high priced.

The industries, represented by "machinery and tools," exported products of two billion francs value in 1929, and "other manufactures of metal" reached a like figure. This represents a record for France in spite of changes in volume and value of certain classifications of the products included in the schedule.

Alarming increases in imports of like goods amounted to 1,650,000,000 francs in 1927, 2,640,000,000 francs in 1928 and 3,600,000,000 francs in 1929. The latter valuation was an increase of 68 per cent over that of the previous year. This is naturally proving a disturbing factor in the desired economic adjustments looked for in the industry.

On this score it is hardly likely that Monsieur Briand's "Economic United States of Europe" just sprung upon the world by means of an official message to interested, and some disinterested, nations, whether it eliminates American participation in the trade of an increasingly prosperous Europe to the extent looked for or not, will improve matters. Not for France at least, so long as she is working under her present handicaps.

In addition to Germany's reparations in kind in 1929 (2,832,000,000 francs in value of "machines, tools, and other manufactures of metal") there were imported another 1,961,000,000 francs of the same goods on open trading account from the same source, 500,000,000 francs from Great Britain, 250,000,000 francs from Switzerland and 200,000,000 francs from the Belgo-Luxembourg Union. This is an increase of 53 per cent for the first-named country and 25 per cent for the last-named. The inter-European trade exchanges in machinery lines do not appear to be languishing.

Prices of machinery and tools imported fell from an average of 14,500 francs the metric ton in 1928 to 13,600 francs in 1929. This is in close accordance with the drop in the general cost index of 574 on Dec. 31, 1929, and 614 on Dec. 31, 1928.

Regardless of continual improvement in the grade and efficiency attributes of machinery imported, the value per ton shows a diminution of approximately 6 per cent, which in a way suggests that prices are falling, though complaint is made by French buyers of American machinery that catalog prices at least do not tell the same story.

In any case, any drop which may have been made apparent by imports from whatever source had to be met by local manufacturers as a result of the sympathetic influence alone. This accounts to some extent for the complaint of the French manufacturer that business is

not profitable. The prime element affecting industrial prosperity in the last analysis is, however, the excessive fiscal taxation which it has to carry, from which the industries of the chief countries exporting to France are mainly free.

French machinery manufacturers and importers alike complain of inability to extend long credits to purchasers who are seeking plant extension or the addition of new tools. Unquestionably the French credit structure is weak, considered on those lines. It is pointed out repeatedly in conferences and assemblies of the solons of industry that this is a handicap which industrial Great Britain, Belgium, Germany, and Italy have been able to surmount. The more so is this agonizing from the fact that France has the greatest per capita gold reserves.

The solution for all these ills, as proposed by the French Federation of Machinery Constructors, is tighter collaboration between all interests—rationalization, in other words.

The new French tariff as applying to imports of automobiles and parts suggests what may sooner or later happen to machinery and parts certainly will be asked for. The following are striking examples. Friction appliances now pay customs dues from 1,400 francs to 5,600 francs the 100 kilos, axles from 750 francs to 3,000 francs, caterpillar equipment from 250 francs to 1,000 francs, internal combustion engines 4,000 francs, shafting and clutches from 1,350 to 5,400 francs and piston rings from 60 francs to 240 francs the kilo (2.2 lb.)

The labor situation is more than ever sensitive to the trend of general economic conditions. Denatality as a result of the war is believed will have diminished native skilled and unskilled labor in industry to the extent of half a million in the last 15 years and the next 10 to come.

"Iron Trade Review" Becomes "Steel"

Iron Trade Review, contemporary Penton publication, becomes *Steel* with the current issue, according to an announcement in *The Business Week*. There will be no change in editorial personnel, but changes in makeup and presentation are planned.

Putnam Exhibits Machine Tools

On June 26, 27, and 28, the Putnam Works of Manning, Maxwell & Moore held a private display of machines at the Fitchburg, Mass., plant. The exhibit included a billet gouger, a billet peeler, a 48-in. rotary slitting machine, a 42-in. planer type open-side milling machine, a 36-in. open-side planer, a 48-in. double-housing planer, two 90-in. journal turning lathes, a 90-in. quartering and pin turning machine, two 72-in. continuous rotary millers, two heavy double axle lathes, and a 48-in. carwheel lathe. These machines were for the most part awaiting shipment.

Special interest centered on the billet gouger, a modification of the design announced in the *American Machinist*, Vol. 72, page 544. Test billets of 0.50 carbon steel, high-speed steel, Monel metal, and aluminum were gouged during the exhibit. The new rotary slitter and many of the other machines were shown in operation. The exhibit was well attended by steel mill and railway shop executives.

Simonds Announces Economic Contest

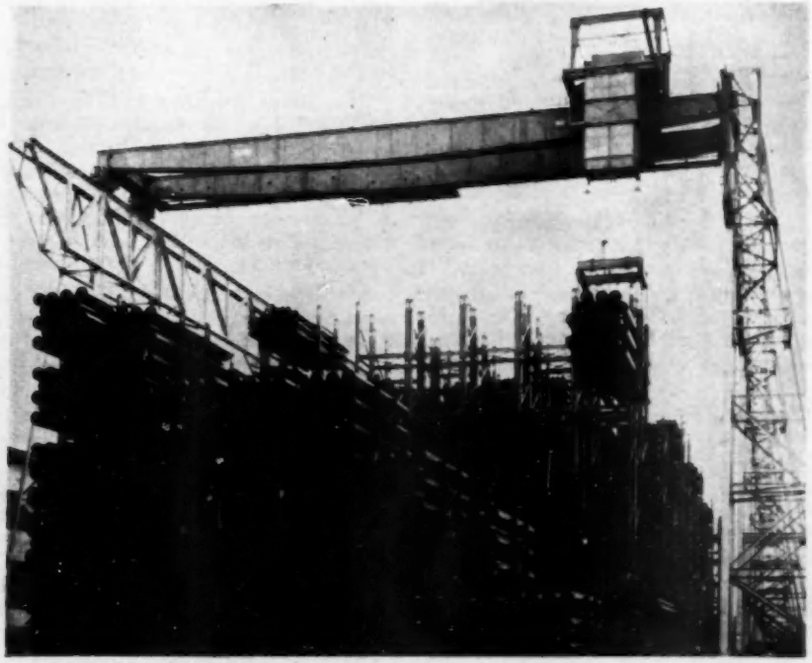
The Ninth Annual Economic Contest sponsored by Alvin T. Simonds was announced recently, to secure a more general interest in economics as related to business and to industrial and general welfare. The subject announced for this year's contest is "Government Interference with the Free Play of Economic Forces," and two prizes are offered, one of $1,000 and the other of $500. The contest closes Dec. 31, 1930, and communications should be addressed to the Economic Contest Editor, Simonds Saw & Steel Company, 470 Main St., Fitchburg, Mass.

Norton Makes Grinding Wheel Changes

The amount of abrasive in relation to the other factors entering into the construction of grinding wheels and the method for controlling that variable has been the subject of study by engineers of the Norton Company for the past several years. This study has brought forth a new method of manufacture referred to as control of the volume structure of the grinding wheel. The manufacturers state that as a result of the development it is now possible to effect finer refinement in wheels than is possible by changing the grain and grade. In other words, by varying the "volume structure" of the wheel it is possible to procure specific grinding action according to the desires of the consumer and to duplicate that wheel at any time. The company's method of numbering grinding wheels has been changed to suit the new development.

New York Forms Economic Council

Alarmed because of the relative halt in the economic development of New York State, and anxious to seek and apply adequate remedies, leaders in the state's business and professional fields recently announced the creation of The New York State Economic Council. In a broad sense, the New York State Economic Council will be similar to the New England Council which has operated so successfully for the last five years. Officers of the New York Council include Merwin K. Hart as chairman; Elon H. Hooker as vice-chairman; James W. Gerard as treasurer, and Robert S. Binkerd as chairman of the executive committee. Included in the board of directors are Magnus W. Alexander and James H. McGraw.



TWO HUNDRED MILES OF PIPE

Welded steel crates, each holding a carload, are used by the A. O. Smith Corporation, Milwaukee, for stacking pipe for ease in handling. The size of the sections may be compared with that of the automobile in the lower left-hand corner

BUSINESS ITEMS

The Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has entered into a patent licensing arrangement with, and will acquire a minority interest in, the English Electric Co. Ltd., of Queens House, Kingsway, London, according to a recent announcement. The Westinghouse Electric International Co., has concluded a comprehensive arrangement with the English concern for an exchange of technical information on steam turbines and electrical apparatus. The arrangement includes the granting of licenses for the use of patents and for the manufacture and sale of various products, and is reported to be effective throughout the British Empire, except in Canada.

Plans have been completed and everything is in readiness to proceed at once with the construction of the plant at Waterloo, Ont., wherein the Sunshine-Waterloo combine will be manufactured. Railway sidings are being built by both the Canadian Pacific Railway and Canadian National Railway companies. The first unit of the new plant will be ready during the coming autumn and will have a capacity for an annual production in excess of 2,000 combines. The largest building of this unit will be the assembly room which will measure 450 ft. in length, with three assembly lines.

The Youngstown Sheet & Tube Co. will proceed at once to erect a plant for production of electrically welded steel pipe, according to a recent announcement by Frank Purnell, president. The unit will manufacture tubing from 18 to 26 in. in diameter and will be located at the Brier Hill Works, where Sheet and Tube has a plate mill that will supply the steel needed in the manufacture of the pipe. The new unit will have a capacity of approximately 144,000 tons annually and will be erected at a cost of $2,000,000.

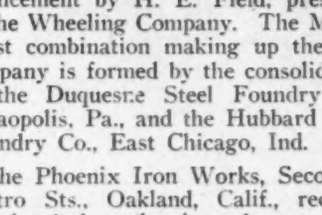
The Kelsey-Hayes Wheel Corporation has purchased the manufacturing facilities and plant of the Jaxon Steel Products Co., a General Motors subsidiary, according to an announcement by Alfred P. Sloan, president of General Motors. Incident to the negotiations General Motors acquired the necessary patent rights covering the manufacture of wire wheels, and production will be set up in another plant.

The Midwest Steel Corporation, an Indiana corporation, is a wholly owned subsidiary of the National Steel Corporation, with a nominal capital of $100,000, later to be increased to $50,000,000 or more. The Midwest will be the operating subsidiary of the National Steel in the Chicago area, and will establish a steel mill representing an investment of between $40,000,000 and $50,000,000 in the Chicago district.

The Wheeling (W. Va.) Mould & Foundry Co. has been acquired as one of the units to form the new Continental Roll & Steel Foundry Co., Chicago, according to an official announcement by H. E. Field, president of the Wheeling Company. The Middle West combination making up the new company is formed by the consolidation of the Duquesne Steel Foundry Co., Coraopolis, Pa., and the Hubbard Steel Foundry Co., East Chicago, Ind.

The Phoenix Iron Works, Second & Castro Sts., Oakland, Calif., recently completed the enlarging of several departments and the installing of new equipment, including a large crane. Among large orders finished by this plant include 400 winch cylinders for ships in the inter-coastal service. S. D. Russell is president.

The Graton & Knight Co., Worcester, Mass., will celebrate the 100th birthday on July 10 of Henry Clay Graton, the still-living founder. Mr.



Graton and a friend of his, Joseph A. Knight, decided to go into the leather belt business when Mr. Graton was 21, starting the firm which is now the country's largest manufacturer of leather belting and which is in its 80th year.

The Bettendorf Manufacturing Co., Bettendorf, Iowa, has been organized to take over the properties and assets of the Davenport Manufacturing Co. and the Bettendorf Oil Burner Co. J. W. Bettendorf will be president; J. Reed Lane, vice-president; W. H. Martin, secretary; and E. J. Bettendorf, treasurer of the new corporation.

The Art Metal Construction Co., Jamestown, N. Y., has taken a long-term lease on the entire second floor of the Lovejoy Industrial Bldg., 2109 So. La Salle St., Chicago, comprising 18,000 sq.ft. to be used for warehouse and service purposes. Sales offices will remain at 173 West Madison St., Chicago.

The Electric Steel Foundry Co., 24th & York Sts., Portland, has just completed negotiations with the Krupp works in Germany whereby it can use the patented Krupp process for the manufacture of stainless steel.

The Anaconda Wire & Cable Co. of California, through C. Dent Slaughter, district manager, has announced the following changes in the addresses of its three Pacific Coast warehouses: in San Francisco, 360 9th St.; in Los Angeles, 430 Colyton St.; and in Seattle, 914 First Ave. South.

The Krupp Nirosta Co. Inc., Watervliet, N. Y., has granted a license to the Ohio Seamless Tube Co., Shelby, Ohio, under which this company will manufacture seamless tubing from Nirosta KA2 corrosion and heat-resistant nickel-chromium steel.

Aluminum Colors Inc., Indianapolis, Ind., recently purchased all equipment and patents, etc., in connection with the "Alumilite" process from the Metals Protection Corporation of that city. The purchasing company is a new organization and has M. L. Gould as president; Fred A. Wales, vice-president and John D. Gould as secretary-treasurer.

The Consolidated Foundry and the St. John's Nail Manufacturing Co., whose affairs are now being wound up, will be merged in a new company, the United Nail & Foundry Co., with a paid-up capital of $360,000. Negotiations are now in progress for expenditures up to $60,000 immediately and $100,000 ultimately for new plant and equipment. Both industries are located in St. John, New Brunswick.

Joseph T. Ryerson & Son, Inc., Chicago, Ill., have recently become general distributors for the following additional lines of machine tools: Shapers and planers built by the Ohio Machine Tool Co.; lathes built by the Sidney Machine Tool Co.; radial drills built by Dreses Machine Tool Co., and horizontal boring, drilling, and milling machines built by the Ohio Machine Tool Company.

The Jefferson Electric Co., Chicago, has formed a Canadian company, the Canadian Jefferson Electric Co., Ltd., which has leased manufacturing space with railway siding facilities in Toronto. A. A. Anderson of Chicago has been appointed manager of the Canadian company.

The Prest-O-Lite Co., Inc., 30 East 42nd St., New York, N. Y., has opened a new plant for the manufacture of dissolved acetylene at 1240 Stewart Ave., S.W., Atlanta, Ga. With the opening of the new plant, the old plant at 345 Kuhrt St., S.W., Atlanta, will discontinue operations.

The Associated Alloy Steel Co., sales division for the corrosion and wear-resistant alloy steels of the Ludlum Steel Co., the Sharon (Pa.) Steel Hoop Co., and the Timken Steel & Tube Co. has leased offices in the Chrysler building, New York City, on the 48th floor.

A section of the old Illinois Thresher Co. factory, Sycamore, Ill., has been leased by the Rotary Plow Co., Seattle, Wash., which will immediately establish a pattern works there with the prospect of establishing a Mid-West branch.

Engineering Products of Canada, Ltd., has been incorporated in Canada for the manufacture, in Montreal, of the "Wajax" fire pump. Watson Jack & Co., Ltd., Castle Bldg., Montreal, will be general sales agents for the new firm. D. G. Macpherson, president of Watson Jack & Co., is also president of the new company. Wilfred Lavalee will be vice-president and general manager.

Tube Turns, Inc., Louisville, Ky., is making additions to the plant and equipment which will increase its capacity by 60 per cent, according to an announcement by Walter H. Girdler, president of the Girdler Corporation, which operates the Tube-Turns Company.

The Albatross Steel Equipment Co., Los Angeles, will establish a Northwest assembly plant at Seattle, Wash., according to an announcement by Reynelle G. E. Cornish, president.

The Munson Steel & Tube Co., Chicago, has leased 10,000 ft. of space in the Ashland Industries Building Corporation at Ashland Ave. & Seventy-fourth St., Chicago.

William Swindell & Brothers, the Gas Combustion Co., American Dressler Tunnel Kilns, Inc., and the Duquesne Burner Service Co., have consolidated to form the Swindell-Dressler Corporation with offices and plant at Pittsburgh. The company's address is P.O. Box 1753.

The Hamilton Aero Manufacturing Co., Milwaukee, now operating in combination with the Standard Division of the United Aircraft at Pittsburgh, has sold its property in Milwaukee.

The National Equipment Co., a Delaware corporation, has filed papers with the secretary of state in Indianapolis to qualify the corporation to do business in Indiana. H. W. Taylor, Indianapolis, is named agent.

A Dominion charter of incorporation has been issued to the De Walt Production Corporation of Canada, Ltd. The head office of the company is at Galgary, Alta., and its authorized capital is $100,000. The company will manufacture and deal in woodworking machinery.

The Gray Hub Co., Detroit, has appointed the Tool Equipment Sales Co., 18 So. Clinton St., Chicago, as representative to handle sales of multiple spindle drill heads in that territory.

The Brown Instrument Co., Philadelphia, Pa., recently let a contract for 40,000 sq.ft. of additional floor space in the form of two additional floors on all of the two-story concrete sections of the plant. Construction will be started shortly and the new space will be occupied early this fall.

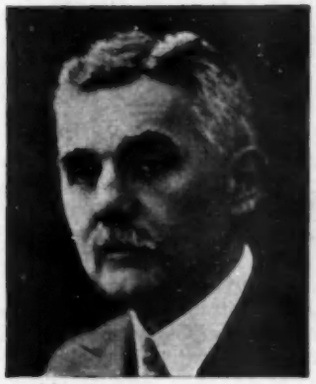
The Wildman Manufacturing Company, Norristown, Pa., awarded a contract recently for the design and construction of a 100x200-ft. extension to its present plant. The extension will be of steel frame construction, costing approximately $100,000. F. B. Wildman is president.

The Vernon Foundry Co., Hollydale, Calif., has transferred the manufacture and sale of Vernon presses and shears to the Baash-Ross Tool Company, 5512 South Doyle Ave., Los Angeles. Regular production schedules at the latter company's plant are already under way.

The Anaconda Wire & Cable Co. has purchased the two-story plant of the Weill Barnfield Corporation, Pawtucket, R. I., containing 25,000 sq.ft. of floor space. About 140,000 sq.ft. of land is included.

The Goslin-Birmingham Manufacturing Company, Birmingham, Ala., has been affiliated with the Whiting Corporation of Harvey, Ill. The Goslin-Birmingham Company is the successor to the old Birmingham Machine & Foundry Co., and the Joubert & Goslin Machine & Foundry Co.

The French Academy of Sciences, interested in an experiment of Georges Claude, famous French scientist and France's representative at the Fiftieth Anniversary celebration of the A.S.M.E.,



for gaining electrical power by utilizing the energy created by the varying temperatures of sea water at the surface and in the depths, has recently learned that the second section of the 7-ft. iron pipe which was to lead to water 3,000 ft. below the surface, was broken and lost in placing. This will halt the experiment until a new pipe is constructed.

The Leon Hommel Machine Shops, 24th & Adeline Sts., Oakland, Calif., has the largest aeronautical sign for guidance of aviators on the Pacific Coast. The sign, 254 ft. long, with letters 37 ft. high, is painted in orange, the official aeronautical color. It is on the roof, on an air line to Oakland airport.

The Logan Gear Co., Toledo, Ohio, has expanded its group insurance program to add sick and accident benefits and more than $620,000 accidental death and dismemberment protection to its life insurance already in force. The additional coverage features the co-operative method of paying premiums.

The Master Electric Co., Dayton, Ohio, has discontinued the manufacture of its entire split-phase motor line, according to an announcement by W. R. Clements, vice-president and sales manager.

The Gordon Steel Works, Ltd. (formerly the Steel Trough & Machine Co., Ltd.), Tweed, Ontario, has leased the plant of Machinery & Equipment Co., Ltd., in Hamilton, Ont., has purchased all the machinery and equipment as well as the large stock of finished goods and raw material on hand, and will open up the plant at once for business.

N. A. Strand & Co. 5001 North Lincoln St., Chicago, have appointed Frecker Bros., Inc., 30 Church St., New York City, as direct representatives for Eastern New York State and Northern New Jersey, succeeding W. B. DaSilva, who served in that capacity for the past ten years.

The Gobert Machine Works, Oakland, Calif., has leased 1,750 sq.ft. of floor space at 1025 Forty-first Ave. in that city. John Gobert is owner and manager.

Austin Brothers, Ltd., Halifax, N. S., have been appointed exclusive distributors in the province of Nova Scotia for the distribution of the Rex line of construction equipment manufactured by the Chain Belt Co., Milwaukee.

The Columbia Iron Works, Inc., 4254 Vista St., St. Louis, has increased its capital from $18,000 to $75,000.

The Air Reduction Co., Inc., 342 Madison Ave., New York City, has moved its executive offices to the Lincoln Bldg., 42nd Street, New York City.

The Sloan & Chace Manufacturing Co., Kearny, N. J., has been incorporated with $50,000 capital to manufacture precision tools.

The Jones Superior Machine Co., 1264 West North Ave., Chicago, will erect a one-story factory building at 1258-1260 West North Ave., 70x125 ft.

Reichel & Drews, 425 North Ashland Ave., Chicago, recently awarded the contract for a new machine shop building on the present site.

The Stephens-Adamson Manufacturing Co., Aurora, Ill., has removed its New York sales and engineering office to 50 Church St., Room 1360.

The J. M. Nash Co. is planning to erect a 2-story addition, 30x120 ft., to cost $25,000.

The Titan Electric Co., now in Adrian, Mich., has been recently reorganized, recapitalized, and incorporated. W. F. Roberts is president and W. E. Stewart is secretary-treasurer.

Directors of the National Supply Co., recently formally approved plans for the acquisition of the Spang, Chalfant & Co., through an exchange of stock.

The G. M. Basford Co., 17 East 42nd St., New York City, has moved its offices to the Lincoln Bldg., 60 East 42nd Street.

The Oregon Art Metal Works has opened at 728 Powell Blvd., Portland, Ore. The company is headed by Albert Moessner and Henry Heuchert.

The U. S. Electrical Manufacturing Co., Los Angeles, is enlarging by 25 per cent its manufacturing quarters.

PERSONALS

Mason T. Adams, vice-president and general manager of the Seth Thomas Clock Co., has been elected president of the Beardsley & Wolcott Manufacturing Co., Waterbury, Conn., to succeed Charles F. Beardsley, resigned. Warren F. Kaynor and Mason T. Adams were added to the board of directors.

Clement M. Anson has been appointed assistant to H. J. Kelly, general manager in charge of steel operations of the British Empire Steel Corporation.

C. W. Avery, president of the Murray Corporation of America, Detroit, has been elected chairman of the board, to succeed H. O. Barker, resigned.

Chelsea L. Bailey, special representative at Chicago of the Republic Steel Corporation, Youngstown, Ohio, has been transferred to Cincinnati.

William E. Balliet has been made branch office manager at Birmingham, Ala., for the Blaw-Knox Co., Blawnox, Pa., to succeed P. V. Kelly. Joseph Riley has been appointed assistant Birmingham manager.

Eugene C. Bauer was recently elected president and chairman of the board of the Kensington Steel Co., Chicago, to succeed the late Walter S. McKee. Mr. Bauer was formerly vice-president and was one of the company's founders. Kenneth Jenson, formerly general manager, has been made vice-president and general manager.

Eck L. Baughn, formerly San Francisco district manager, Byron Jackson Pump Co., has resigned to become sales manager for The Bradford Pump Manufacturing Co., San Jose, California.

H. R. Beckwith, formerly with the Oliver Farm Equipment Co., Chicago, has been appointed head of the Belle City Manufacturing Co., Racine, Wis. He was previously assistant sales manager of the former Oliver Chilled Plow Works, South Bend, Indiana.

Monsieur Berland, chief of service of the Fabrique Nationale d'Armes de Guerre of the Belgian Government, will arrive soon to arrange for the expected visit of French, Belgian, and Swiss engineers and manufacturers slated to arrive in New York on July 20 to make a study tour of American engineering establishments and machine-tool shops under the auspices of the Engineering Study Tour Committee.

Harry W. Bockhoff of the National Automatic Tool Co., Richmond, Ind., returned recently from a three-month trip to England and Continental Europe.

C. H. Brandes, formerly chief mechanical engineer and general purchasing agent of the American Metal Co., Ltd., and subsequently vice-president of the Metallurgical & Chemical Corporation and the International Process & Engineering Corporation, has joined the Western Precipitation Co., Los Angeles and New York. He will make his headquarters at the New York office.

Clayton R. Burt, president and general manager of the Pratt & Whitney Co., Hartford, Conn., was elected president of the Manufacturers' Association of Hartford County on June 12.

R. W. Carlisle, Indian Pythian Bldg., Indianapolis, has been appointed factory representative for the Ohio Electric Manufacturing Co., Cleveland, for the sale of fractional horsepower motors.

C. M. Carmichael, formerly identified with the Electro-Metallurgical Co. of Canada, Ltd., has been appointed general manager of the Shawinigan Stainless Steel & Alloy Co., Ltd., a subsidiary of the Shawinigan Power Corporation, Ltd., with headquarters in Shawinigan Falls, Que.

N. B. Chace, Jr., formerly with the Peninsular Machinery Co., Detroit, Mich., has been appointed vice-president and general sales manager of the Fosdick Machine Tool Co., Cincinnati.

W. W. Chace, with offices at 181 Eddy St., Providence, R. I., has been appointed distributor for the states of Rhode Island and Connecticut of lubricating equipment manufactured by the Lubrication Division, Rivett Lathe & Grinder Corporation, Boston, Massachusetts.

A. H. Chappelka, vice-president of the Lake City Malleable Co., formerly the foundry division of the Chisholm-Moore Manufacturing Co., Cleveland, has resigned after being associated with the company for 26 years.

Vice-President Cummings C. Chesney, chairman of the manufacturing committee of the General Electric Co., Schenectady, N. Y., was relieved at his own request on July 1, and was succeeded by Vice-President William R. Burrows. Both men were elected vice-presidents on May 25, 1927, and have been serving together since that time as manufacturing officials.

Stewart N. Clarkson has resigned as assistant director of the National Electrical Manufacturers' Association and has established offices at 522 Fifth Ave., New York, N. Y., where he will render trade association service to certain groups of manufacturers.

Walter Chiverton has resigned as factory office manager of the Art Metal Construction Co., Jamestown, N. Y., to become identified in a similar capacity with the Olean (N. Y.) Metal Cabinet Works, Inc.

William W. Coleman, chairman and president of the Bucyrus-Erie Co., South Milwaukee, Wis., has been elected a director of the American Brake Shoe & Foundry Co., New York.

George G. Crawford, president of the Jones & Laughlin Steel Corporation, Pittsburgh, was recently presented a loving cup in appreciation of his efforts in Alabama's industrial development.

F. D. Crenshaw, Jr., has been elected vice-president in charge of sales of the Federal Abrasive Co., Birmingham.

David T. Croxton has been elected a director of the Corrigan, McKinney Steel Co., Cleveland. At a recent meeting Mr. Croxton was named assistant to W. G. Mather, president.

Thomas A. Edison recently received the John Scott Medal of the City of Philadelphia in recognition of his "outstanding contributions to science."

Frank L. Eidmann has resigned as associate professor in the School of Engineering of Princeton University to become professor of mechanical engineering at Columbia University.

George R. Fink, president of the National Steel Corporation, E. T. Weir, chairman of the board, and a number of officials and directors are on a trip of inspection of various company properties along the Great Lakes.

Frank Dustan of the engineering department of the Putnam Machine Works, has been appointed chief engineer of this plant of Manning, Maxwell

& Moore, Inc. Mr. Dustan joined Manning, Maxwell & Moore in 1919 as a designer and later held positions as assistant chief draftsman and sales engineer, specializing in railroad and steel mill machinery.

Kenneth S. Guiterman of Henry Gardner, Guiterman Co., New York, returned recently from a visit to the London headquarters of Henry Gardner & Co., Limited.

Ronald M. Hussey, superintendent of the Wire Mill, Jones & Laughlin Steel Corporation, Aliquippa, Pa., was elected president of the Association of Iron & Steel Electrical Engineers which held its annual convention recently. Frank D. Egan, electrical superintendent of the Bethlehem Steel plant at Lackawanna, Pa., was elected director-at-large.

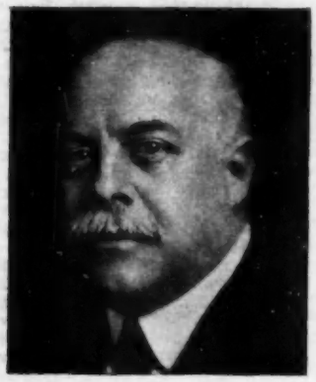
Dr. O. E. Harder, in charge of metallography at the University of Minnesota, has been appointed assistant director of the Battelle Memorial Institute, Columbus, Ohio. He will devote a

portion of his time to the work being conducted at the Institute by the Alloys of Iron committee of the Engineering Foundation.

E. W. Higgins, formerly manager of the New York office of the Maxim Silencer Co., has been transferred to Hartford, Conn., in charge of all sales.

J. C. C. Holding, for the past four years manager of the American Stainless Steel Co., Pittsburgh, has been elected vice-president and manager and will be in direct charge of all activities.

Dr. George K. Burgess, director of the U. S. Bureau of Standards, was re-elected president of the National Con-



ference of Weights and Measures at the recent annual meeting.

Rudolph E. Prussing, vice-president of the Whiting Corporation, has been appointed Chicago district sales manager with headquarters at the new Chicago office at 20 North Wacker Drive. He has been connected with the Whiting organization since 1908. Ray H. Moore has been appointed district sales manager in charge of the Cleveland office. Mr. Moore was previously manager of the foundry and equipment department at Harvey.

T. G. Hart, associated with the Terry Steam Turbine Co., Hartford, Conn., since 1919, and for several years manager of the Chicago office, has been appointed general sales manager with headquarters at Hartford.

A. L. Humphrey, president of the Westinghouse Air Brake Co., Wilmerding, Pa., was recently tendered a testimonial dinner at Pittsburgh on the occasion of his seventieth birthday. A. W. Robertson, chairman of the Westinghouse Electric & Manufacturing Co., was toastmaster.

J. J. Pelley, president of the New York, New Haven & Hartford Railroad, became president of the New York, Westchester & Boston on July 1 to succeed Leverett S. Miller, retired.

H. W. Petty has been appointed Pittsburgh branch sales manager for the Wagner Electric Corporation, St. Louis.

B. W. Marron, general manager of the Buffalo plant of the Hanna Furnace Co., Cleveland, has resigned.

Lloyd R. Smith, president and general manager of the A. O. Smith Corporation, Milwaukee, Wis., received the honorary degree of Doctor of Laws conferred by the University of Wisconsin, Madison, at the annual commencement.

OBITUARIES

Anthony Foeder, 69, president of the B. & F. Manufacturing Co., Indianapolis, which he aided in founding ten years ago, died on June 12 following a month's illness. He had been associated with the foundry business for 54 years.

John S. Maddicks, 71, engineer with the H. H. Franklin Manufacturing Co., Syracuse, N. Y., for 27 years and a department superintendent for the past 11 years, died recently at his home in that city following a short illness.

Marvin D. Edgerton, 67, head of the Penfield Saw Works, Bristol, Conn., died June 20. He was formerly connected with E. N. Welch Co. Later he was superintendent of the Bristol Manufacturing Co.

Richard W. Alexander, treasurer of the Poole Engineering & Machine Co., Baltimore, died in that city on June 19. He had been associated with the company for six years.

Frank V. Knauss, 80, president and founder of the Portsmouth (Ohio) Stove & Range Co., died recently at his desk. He was also president of the Madsenell Corporation, New York. Mr. Knauss founded the Washington Stamping Co., at Washington Court House, Ohio, in 1881. Two years later he was appointed manager of the Ohio Stove Co., where he served for six years. The Portsmouth Stove Company was organized in 1889.

J. S. Crowther, 47, assistant general manager of the Interlake Iron Corporation, Chicago, died on June 13 at Toledo, Ohio, where he had gone on a business trip. For several years he had been general superintendent of the Toledo (Ohio) Furnace Co., which with several other interests, was recently merged to form the Interlake Iron Corporation.

Douglas G. Harvey, 46, president of the Reynolds Wire Co., Dixon, Ill., died as the result of a heart attack at New Haven, Conn., on June 12, while attending a Yale class reunion.

Col. William Enders, 79, vice-president of the Simmons Hardware Co., St. Louis, with which he was connected for 50 years, died recently at his home in St. Louis. He was the inventor of the Enders safety razor.

Albert J. Francis, 55, manager of the fractional horsepower motor section of the industrial department of the General Electric Co., died on June 17. He was made manager of the section on Jan. 1, 1916.

John P. Luitink, vice-president of Luitink & Sons Manufacturing Co., Milwaukee, died on June 14.

Frank Buchanan, 68, superintendent of the headlight division of the Crouse-Hinds Co., died at his home in Syracuse, N. Y., following a short illness.

Merritt L. Wolfe, 42, secretary, Berger Bros. Co., Philadelphia, died on June 13 at Ocean City, N. J., following an extended illness.

FORTHCOMING MEETINGS

INTERNATIONAL CONGRESS FOR GENERAL MECHANICS — Liege, Belgium, Aug. 31 to Sept. 7. For information address Alb. Schlag, 4 Place Saint Lumbert, Liege, Belgium.

NATIONAL METAL CONGRESS—Twelfth annual Congress and Exposition, Stevens Hotel, Chicago, Sept 22-26. W. H. Eisenman, secretary of the A.S.S.T., 7016 Euclid Ave., Cleveland, Ohio, is director.

AMERICAN WELDING SOCIETY—Annual fall meeting, Congress Hotel, Chicago, September 22-26. W. M. Spraragen, 29 W. 39th St., New York, N. Y. is technical secretary.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Annual fall meeting of Iron & Steel Division and Machine Shop Practice Division, Stevens Hotel, Chicago, September 22-26. P. T. Wetter, 29 W. 39th St., New York, secretary.

AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS — Annual fall meeting of Iron & Steel Division, Stevens Hotel, Chicago, September 22-26. T. T. Read, 29 W. 39th St., New York, N. Y., is secretary.

AMERICAN INSTITUTE OF MINING & METALLURGICAL ENGINEERS — Annual fall meeting of the Institute of Metals Division, Stevens Hotel, Chicago, September 22-26. W. M. Corse, 29 W. 39th St., New York, N. Y., is secretary.

AMERICAN SOCIETY FOR STEEL TREATING—Annual Convention, Stevens Hotel, Chicago, September 22-26. W. H. Eisenman, 7016 Euclid Ave., Cleveland.

NATIONAL SAFETY CONGRESS—Nineteenth Annual, to be held at Fort Pitt and William Penn Hotels, Pittsburgh, from Sept. 29 to Oct. 3. Metals Section meetings will be held on Tuesday and Wednesday mornings and Thursday afternoon.

AMERICAN GEAR MANUFACTURERS' ASSOCIATION — Semi-Annual meeting, Hotel Clifton, Niagara Falls, Ont., Canada, from Sept. 29 to Oct. 1.

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION—29th Annual Convention, Hotel Aspinwall, Lenox, Mass., October 13-15. Ernest F. DuBrul, 1415 Enquirer Bldg., 617 Vine St., Cincinnati, Ohio, is general manager.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine-tool business

THE following reports, gathered from the various machinery and machine-tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

CLEVELAND

With one or two exceptions, the local machinery and machine-tool business continues to display weakness. Sales for the past weeks were fewer than in the previous two weeks. Buying is on the hand-to-mouth basis and only tools for immediate needs are being purchased. Inquiries are declining. An Akron tire manufacturer recently cancelled half of his list of tools. One exception to the general report of poor business is the punch press division. This line has been fortunate enough to show steady gains for the first half of the year.

The trade is unanimous in the declaration that by September a general upward swing will be in progress.

PHILADELPHIA

Interest of machinery and machine-tool dealers and manufacturers centers now in plans of the New York Shipbuilding Co., whose recent acquisition of an order for two vessels has brought inquiries for much equipment, but no orders as yet. Aside from that, the market continued uncertain during the last few weeks. There were a few inquiries from industrialists seeking data on prospective delivery of shop equipment, and some of the sales agencies reported a fairly good volume of June business from firms which needed replacement equipment.

The best that can be said for the market for June is that it was decidedly spotty.

DETROIT

There is a growing belief among machinery and machine-tool dealers in Detroit and Michigan that the trade will experience the beginning of an upward trend in the latter part of August and September. July is not expected to be a profitable period, as nearly all of the automobile plants are closing for at least two weeks and some for three and four.

General business conditions are at an extremely low ebb, but there is a great deal more optimism than there has been for the past few months. Dealers are idle and most of their salesmen are either taking their vacations or are planning to do so.

Conditions in the machinery and machine-tool field are probably poorer than they have ever been here.

NEW YORK

According to New York machinery and machine-tool dealers, there are a few sales occurring, but these are small and come from unexpected sources. Expected purchasers have extended their preparations for a safe and sane Fourth into their buying, and have definitely decided that safe practices should be followed as closely as possible in that field at least. Even though many companies need tools, they have neglected to admit it in any form more tangible than in inquiry. Dealers have one satisfaction, however. At least, business is no longer going down. It is going along steadily, or rather standing still steadily. It must be admitted that there is some virtue in that. The holiday of the present week definitely concludes any prospects of a pickup; in fact, little change of importance is expected before fall. Meanwhile, good prices and better deliveries go begging.

CINCINNATI

Most of the machine-tool manufacturers of the Cincinnati district found business dull and the general market sluggish during the past week. Three exceptions are a manufacturer of large boring mills, who stated that they are very busy, and two manufacturers of smaller tools, who stated that business is better than fair. Taking the trade as a whole, there was no further recession, and there are some indications that the next change will be for the better.

Selling agents noted no change, and express gratitude that they have been able to hold their own in the present sluggish market.

The greater portion of the week's business came from metal-working industries in various lines, whose requirements were largely confined to single items. A few scattered orders of small size came from railroads and from concerns in the automotive and allied industries, and there were a few small export sales.

SLOW MOTION, once limited to the movies, seems now to have invaded the machinery and machine-tool market. Efforts of tool men are about as effective as those of theater spectators in speeding up the action. No speed-up of the business drama is predicted immediately either, for paradoxically, the rise is expected in the fall. Meanwhile, attractive prices and deliveries even more attractive go a'begging. The used tool markets are also becoming irked at the continued lag in demand.

NEW YORK'S market has steadied at the bottom, and there is now a small amount of business available from week to week. Cincinnati's business is dull and sluggish, with a few surprising exceptions. New England June volume showed no change from that of May, and no change is expected immediately. Milwaukee inquiries are fair, and business is holding its own with a fair number of small orders. Cleveland reports continued slowness, however, with the upturn set for September.

PHILADELPHIA dealers and manufacturers are interested in the plans of the New York Shipbuilding Co., which recently received an order for two ships and is now inquiring for tools. Detroit places the upturn in August or September, and expresses increased optimism despite present quietness. Chicago business is at its lowest level for the year and the dealers are quoting the old refrain, "What can't be cured must be endured." The added slowness is attributed largely to the holiday.

CHICAGO

With the advent of the vacation season, and the announced closing down of practically all machinery houses next week from Thursday to Monday because of July 4, the machine-tool market has reached possibly the lowest level of the year. Predictions are freely made that by September an upward curve will be shown, it being argued that the business of the country must of necessity react in due time. The prevailing note at present is one of resignation to circumstances, on the theory that what can't be cured must be endured. Differing from almost all reports by manufacturers' representatives and selling agents, the local representative of a large machine-tool manufacturing plant informed the writer that the money volume of sales by his house for this month thus far has exceeded that for June, 1929, by a large percentage. He qualified this, however, by adding that June of last year was a comparatively poor month, measured by sales. The only lists of any account received within the last week came from the Chicago Board of Education.

NEW ENGLAND

New England machine-tool builders, according to a consensus of opinion, have decided generally that there is no immediate panacea for business. The situation seems to have developed a trend that must burn itself out. In other words, the remaining summer months are just a number of 30-day periods lying between dullness and a probable upward trend.

Business during the past week was slow but no slower than several recent 7-day periods. Inquiries have assumed a sparcity and are devoted to single units. Orders are scattered and call for single machines. The demand for grinders, a feature of New England business since the first of the year, has slumped to a notable degree. A Hartford press manufacturer has purchased a number of machines from the Gisholt Machine Co. running to a two-figure valuation. As a whole, however, demand is stagnant.

MILWAUKEE

Reports on June business in the Milwaukee machinery and machine-tool market indicate a difference of opinion as to conditions and sales, but it is generally stated that inquiries are fair to good and that orders are running behind a year ago. Some of the manufacturers say that June was slightly better than May but still behind last year, and that business is about holding its own with a fair amount of small orders. While no large orders are being booked, the total aggregate of small units is producing a fair amount of business. The sources of these orders are widely scattered among miscellaneous concerns in the metal trades and general industries. Demand from automobile manufacturers in this territory is very quiet, while tractor and farm implement, airplane, and similar lines are out of the market.

Conditions in the used-tool market are reported to continue very quiet with practically no demand but plentiful supplies. Dealers in machinery supplies in Milwaukee report business as unsatisfactory, in fact, state that the demand for supplies is not as good as it has been and that there is no immediate prospect for improvement.

BUSINESS • BAROMETER

Market decline is a natural one, entirely in accordance with precedent

THEODORE H. PRICE
Editor, Commerce and Finance, New York

JUST as the boom of 1929 was accompanied by the circulation of rumors that were absurdly bullish, so the stock market decline in 1930 has been hastened and aggravated by bearish rumors that were equally ridiculous. Therefore, readers of this letter are advised to disregard all rumors, and to act only upon statements that are authenticated. Of course, we are all likely to be mistaken, and none of us are omniscient, but we believe that the banking fraternity and the brokers who are members of the New York Stock Exchange are in a thoroughly sound position, and that they can weather any storm with safety.

The decline that has taken place in the market is a natural one. Many securities sold below the prices they touched on the 13th of November, 1929. This is in accordance with precedent. A major decline rarely strikes bottom when the first collapse occurs. It takes time and the compulsion of circumstances to work a change in public opinion, and the confidence in higher prices which pervaded this country so widely last year is too deep-seated to be easily shaken. That it is becoming shaken is, however, obvious, and confidence in the earning power of many enterprises has been sufficiently disturbed to make it easy to shake out some of their stockholders. Presently those stockholders will become philosophical, and decide that they cannot do better than to let their money stay where it is while they wait for a recovery.

The records show that hardly more than 10 per cent of the stock of any important corporation changes hands on an advance or decline in the market price, and there is no reason to doubt that the present movement will cause a larger number of people to let go their holdings. But 10 per cent of the total capital of any corporation is an important factor in its influence upon prices, and until it finds a lodgement amongst holders who are both opulent and confident it may be a disturbing influence.

By way of applying the above generalizations practically, it may be asked whether stocks are now a purchase or a sale. The position is so complex that this question cannot be answered categorically. It is, however, in order to point out that with call money available on the Stock Exchange at 1½ per cent, credit is cheaper than it has been since before the war, and that the stimulating power of low interest rates is proverbial. The converse was maintained a year ago, but those who proclaimed a new economic era are for the most part silent.

Another factor that bears upon the future of the security market is the commodity price level. It is at present very low, and there is a widespread disposition to expect and predict lower prices, but quotations must be very near the irreducible minimum, and it would be hard to drive them much lower.

Silk has reached a new low level below $3 a pound. Hides are also lower. Sugar is, however, steadier at somewhat above the recently established low record. Present prices on duty paid sugar in New York represents the equivalent of less than 1¼ cents a pound to the Cuban producer. It is perfectly obvious to anyone familiar with the industry that sugar cannot be produced at that price.

Tin is one of the few commodities which have shown any strength during the past week. It has advanced on reports that a two months' cessation of production shortly will be agreed upon by the leading producers in the Far East.

The grain markets have been alternately weak and strong. Wheat declined 3 to 4 cents but recovered practically all the loss on Thursday.

A decline of 3 cents a bushel in the price of wheat is not such a severe loss after all, and friends on the commodity exchanges tell us that a noticeable stream of buying orders is gradually turning their way.

Activity in the steel industry continues to recede, but the recession in operation during the past week was less than in the previous one. Activity in the entire industry is placed at 66 per cent of capacity, as compared with 68 last week and 71 the week before.

Based on figures derived from census returns covering about one-fourth of the country, Secretary of Commerce Lamont estimates that the number of persons out of work in the United States who are able to work and are seeking employment is about 2,300,000. This total is regarded by government officials as not much above normal, and is smaller than has been generally believed. The American Federation of Labor has estimated the number of unemployed at 3,600,000.

The European situation is also better. The tariff bill and the other political scarecrows have been used for about all they are worth, and the question of buying stocks will always involve a comparative study of the securities that are for sale. Therefore, a study of the merits of these securities and the past history of their earnings and dividends will probably be of value soon.

THE BUSINESS WEEK

July 2, 1930

"THE BUSINESS TIDE reached its ebb during the past two weeks, and is beginning to turn, very slowly and tentatively, in face of a strong current of peevish, superficial, and premature pessimism. . . . There will be no noticeable change in the next few weeks. Continued liquidation in certain lines will overlap and obscure increasing resistance, stabilization, and upturn in others. . . . Progress will be slow, irregular, spasmodic, with sporadic relapses, successively less frequent and sharp, till the end of July. Then, in the same weeks when a year ago the downturn began, a decisive recovery will set in, general and definite enough to be evident even to the blue-funk brigades of business who have been enjoying their May-parties and June-walks in the cemetery. . . . The rise of the business curve thereafter will be rapid, and will, as usual, steal a march on the slow-witted and self-centered stock market. By October it will be back to normal. . . . This forecast is not based solely on the sharp circumstantial rise in our index from the low point of 88.8% of normal last week to 93.6% this week. Other statistical straws suggest strongly that the confused economic currents are setting more uniformly in the direction of recovery. The adjournment of Congress will help clear the channel."

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THE WEEKLY PRICE GUIDE . . . .

Rise and Fall of the Market

THIS is the week of the regular Fourth-of-July shut-down in more than one industry. The usual inventory taking will afford a chance, in many cases, for demand to catch up with reserve supplies. Automotive and railway buying of steel materials continues slow and unpromising. Lap-weld steel pipe is moving in exceptionally large volume, while structurals appear to be gaining in demand. A weak price situation exists in nonferrous metals out of warehouse stocks in the principal centers. This week saw declines in copper, tin, lead, zinc, solder, fabricated brass and scrap.

(All prices as of June 27, 1930)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$16.69@$18.19
Northern Basic	19.89@ 20.39
Southern Ohio No. 2	19.89@ 20.39
NEW YORK—Tidewater Delivery	
No. 2 Southern (silicon 1.75@2.25)	18.00@ 18.50
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	14.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	20.00
Virginia No. 2	18.75@ 19.25
Basic	22.29
CHICAGO	
No. 2 Foundry, local (silicon 1.75@2.25)	19.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	18.20
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	19.63@ 20.13
Basic	19.63@ 20.13
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.50
Cleveland	5.00
Cincinnati	4.50
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.00	3.35†	3.25	3.50@3.60†
No. 12	2.05	3.45†	3.30	3.55@3.65†
No. 14	2.15	3.55†	3.40	3.60@3.70†
No. 16	2.25	3.65†	3.50	3.70@3.80†
Black				
Nos. 18 to 20	2.30@2.35	3.85†	3.55	3.45@3.70
No. 22	2.45@2.50	4.00†	3.70	3.60@3.85
No. 24	2.50@2.55	4.05†	3.75	3.65@3.90
No. 26	2.60@2.65	4.15†	3.85	3.75@4.00
No. 28	2.75@2.80	4.75†	4.00	3.90@4.15
Galvanized				
No. 10	2.50	3.90†	3.80	3.55@3.80
Nos. 12 to 14	2.60	4.00†	3.90	3.65@3.90
No. 16	2.70	4.10†	4.00	3.75@4.00
No. 18	2.85	4.25†	4.15	3.90@4.15
No. 20	3.00	4.40†	4.30	4.05@4.30
No. 22	3.05	4.45†	4.35	4.10@4.35
No. 24	3.20	4.60†	4.50	4.25@4.50
No. 26	3.45	4.85†	4.75	4.50@4.75
No. 28	3.70	5.10†	5.00	4.75@5.00

*Light Plates. †Up to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. butt	56.02%	43.48%	53.3%	42.3%	57.3%	44.8%
3½ to 6 in. lap	52. 6%	40.06%	50.8%	37.8%	53.9%	41.4%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28
8	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb.:

Thickness—B.w.g. and Decimal Fractions	Outside Diameter in Inches: ½	⅝	¾	⅞	1	1⅛	1¼
	Price per Foot						
.035″	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049″	18	.17	.18	.19	.20	.21	.23	.25
.065″	16	.19	.20	.21	.22	.23	.25	.27
.083″	14	.20	.22	.23	.24	.25	.27	.29
.095″	13	.21	.23	.25	.26	.27	.29	.31
.109″	12	.22	.24	.26	.27	.28	.30	.32
.120″ or .125″	11	.23	.25	.27	.28	.29	.31	.33
.134″	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb.:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.25†	4.00	3.75†
Cold rolled strip steel	6.25	6.00	6.10
Floor plates	5.10†	5.30	5.00†
Cold fin., round or hexagon‡	3.40	3.65	3.35
Cold fin., flat or square‡	3.90	4.15	3.85
Structural shapes	3.30†	3.00	3.10†
Soft steel bars	3.25†	3.00	3.00†
Soft steel bar shapes	3.25†	3.00	3.00†
Soft steel bands	3.75†	3.65	3.20†
Tank plates	3.30†	3.00	3.10†
Bar iron (2.75 at mill)	3.24	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, 3/16-in. thick by ¾-in. wide. †Up to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse—3/32, 8.35c. per lb.; ⅛, 7.85c. per lb.; 5/32 to ½, 7.35c. per lb.

METALS

Warehouse Delivery Prices in Cents Per Lb. for Small Lots:

Copper, electrolytic, New York			13.50
Tin, Straits, pigs, New York			32.00@33.00
Lead, pigs, E. St. Louis	5.15	New York	6.25@ 6.75
Zinc, slabs, E. St. Louis	4.25	New York	6.25@ 7.25

	New York	Cleveland	Chicago
Antimony, slabs	10.00@10.50	10.50	11.50
Copper sheets*	22.25	21.75	22.75
Copper wire*	14.50	14.68½	15.12½
Copper, drawn, round*	20.75	20.25	21.25
Copper tubing*	24.25	24.00	25.00
Brass sheets, high*	19.00	18.75	19.75
Brass tubing, high*	24.00	23.75	24.75
Brass rods, high*	17.25	17.00	18.00
Brass wire, high*	19.50	19.25	20.25

*Mill, base.

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%.....	25@26	24.30	24.30
Zinc sheets (casks).....	10.25@10.75	11.75	10.11
Solder (½ and ½).....	25.00	25.50	24@26
Babbitt metal, delivered in case lots, New York, cents per lb.:			
Genuine, highest grade.....			50.00
Commercial genuine, intermediate grade.....			37.00
Anti-friction metal, general service.....			31.00
No. 4 babbitt, f.o.b.....			11.00

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va.:

	Nickel	Monel Metal
Sheets, full finished.....	52.00	42.00
Sheets, cold rolled.....	60.00	50.00
Strip, cold rolled.....	55.00	45.00
Rods, hot rolled.....	45.00	35.00
Rods, cold drawn.....	50.00	40.00
Tubing.....	75.00*	90.00†
Angles, hot rolled.....	50.00	40.00
Plates.....	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper.....	9.50@9.75	10.00	8.75@9.25
Copper, heavy, and wire..	9.25@9.75	9.75	8.00@8.50
Copper, light, and bottoms	8.50@8.75	9.50	7.00@7.50
Heavy lead.....	4.00@4.12½	4.00	3.25@3.75
Tea lead.....	2.00@2.25	3.00	2.25@2.75
Brass, heavy, yellow....	4.50@4.75	6.00	5.00@5.50
Brass, heavy, red.....	7.25@7.50	8.75	7.25@7.75
Brass, light.....	3.50@3.75	5.00	4.50@5.00
No. 1 rod-brass turnings.	5.25@5.50	6.00	5.50@6.00
Zinc.....	2.00@2.25	1.25	1.75@2.00

TIN PLATES—Charcoal—Bright—Per box:

"AAA" Grade:	New York	Cleveland	Chicago
IC, 14x20.....	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20.....	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20.....	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20.....	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.....	$0.13	$0.16	$0.15
Cotton waste, colored, per lb....	.09½	.12	.12
Wiping cloths, washed, white, per lb.....	.13½	38.00 per M	.16
Sal soda, per lb.....	.01½	.02	.02
Roll sulphur, per lb.....	.028	.03½	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.....	.148	.164	.152
Cutting oil, about 25% lard, in 5 gal. cans, per gal.....	.65	.60	.65
Machine oil, medium-bodied (55 gal. steel bbl.) per gal.....	.33	.36	.24
Belting—Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin.ft., per inch of width, for single ply:			
Medium grade.....	30–10%	30–10%	35%
Med. grade, heavy wgt.....	30%	30 –5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft.:			
First grade.....	50%	50–10%	50%
Second grade.....	60%	60– 5%	50–10%

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars.....	per lb.	$0.0325	$0.0325	$0.0325
Cold drawn shafting..	per lb.	.034	.034	.035
Brass rods.....	per lb.	.1725	.18	.2125
Solder (½ and ½).....	per lb.	.25	.2525	.325
Cotton waste, white..	per lb.	.13	.13	.10@.13½
Disks, aluminumoxide mineral, cloth, No. 1 6-in. dia.....	per 100	4.59	4.59	3.60
Lard cutting oil.....	per gal.	.65	.75	.75
Machine oil.....	per gal.	.33	.33	.33
Belting, leather, medium.....	off list	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs....	off list	50–10%*	50–10%*	50–10%*

*List prices as of April 1, 1927

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*.....	$6.03	$6.03	$6.03
Emery cloth*.....	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†.....	2.61	2.61	2.61
Cloth†.....	4.59	4.59	4.59
Fire clay, per 100 lb. bag.....	1.00	.75	.75
Coke, prompt furnace, per net ton....	Connellsville,		2.50
Coke, prompt foundry, per net ton....	Connellsville,		3.50@4.85
White lead, dry.....	100 lb. kegs...	New York,	13.75
White lead, in oil.....	100 lb. kegs...	New York,	14.25
Red lead, dry.....	100 lb. kegs...	New York,	13.75
Red lead, in oil.....	100 lb. kegs...	New York,	15.25

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less.....	60%
Larger, up to 1 x 30-in., full kegs, list less.....	50–10%
Less than full kegs or case lots, add to list.....	10%
Fitting-up bolts: list less.....	45%
Lag screws:	
Up to ½-in. x 6-in., list less.....	60%
Larger, list less.....	50–10%
Less than full keg or case lots, add to list.....	10%
Rivets:	
Structural, round head, full kegs, net.....	$4.50
Structural, round head, broken kegs, net.....	6.00
Tank, $\frac{7}{16}$-in. dia. and smaller, list less.....	60%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less.....	60%
Larger, up to 3-in., list less.....	40–10%
Less than keg or case lots, add to list.....	10%
Washers:	
Wrought, full kegs, per 100 lb., list less.....	$4.00
Wrought, broken kegs, per 100 lb., list less.....	2.00
Turnbuckles:	
With stub ends, list less.....	20%
Without stub ends, list less.....	50%
Chain:	
Proof coil, base, per 100 lb., net.....	$8.50
Cast iron welding flux, per lb., net.....	.35
Bronzing flux, per lb., net.....	.50

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Opportunities for Future Business

Calif., Emeryville—American Tractor Co., awarded contract for the construction of a 90 x 100 ft. assembly plant. Estimated cost to exceed $40,000.

Calif., Richmond — Parr-Richmond Terminal Corp., awarded contract for the construction of a terminal including warehouse, storage tanks, loading racks, etc. Estimated cost $100,000.

Conn., Bridgeport—Adley Co., Inc., 947 State St., is receiving bids for a 1 and 2 story, 65 x 95 ft. service garage, etc., on State St. Estimated cost $40,000. H. Koerner, 83 Fairfield Ave., Archt.

Conn., Meriden—Bd. of Education, will soon award contract for a 3 story trade school on Miller St. Estimated cost $150,000. L. Hamilton Inc., 22 Church St., Archt.

Conn., Westport—Town, M. Lefler, Supt., will soon award contract for the construction of a 2 story, 68 x 180 and 50 x 50 ft. school, including manual training department. Estimated cost $200,000.

D. C., Washington—Bureau of Yards & Docks, Navy Dept., will receive bids until July 16 for the construction of a 1 story, 57 x 102 x 38 ft. smelting plant building.

Ill., Chicago—Federal Pipe & Supply Co., 900 South Campbell Ave., awarded masonry contract for a 2 story, 41 x 313 ft. warehouse and office. $16,000.

Ill., Chicago—Illinois Steel Co., 208 South La Salle St., plans the construction of a soaking pit building, storage building, etc. at Brandon Ave. Estimated cost to exceed $150,000.

Ill., Chicago—Wisconsin Steel Works, 2701 East 106th St., awarded carpentry contract for a 1 story, 143 x 168 ft. factory at 2800-14 110th St. E. Estimated cost $185,000.

Ind., Marion—Silent Alarm Co., will build a factory on East Charles St. Estimated cost $41,000. Private plans. Work will be done by owner's forces.

Ia., Waterloo — Iowa Highway Commission, J. A. Paulsen, Dist. Engr., 603 Marsh-Place Bldg., will receive bids until July 8 for the construction of a 34 x 110 ft. maintenance garage.

Kan., Wichita—J. A. Butts, awarded contract for the construction of a 2 story, 220 x 225 ft. machine shop and sales and service building at Fannin and Douglas Sts. Estimated cost $75,000.

Mass., Attleboro—G. A. Sweeney, South Main St., awarded contract for the construction of a 1 story service garage and repair shop on Pleasant St. Estimated cost $40,000.

Mass., Brookline—Hotel Beaconsfield Trust, 1731 Beacon St., Boston, awarded contract for the construction of a 1 story service garage. Estimated cost $50,000.

Mass., Brighton (Boston P. O.)—Commonwealth Garage, Brighton Ave., is receiving bids for service station and repair shop on Brighton Ave. Estimated cost $40,000. W. F. Bryant & Son, 334 Washington St., Brookline, Engrs. Noted June 19.

Mass., Watertown—Western Electric Co., 195 Broadway, New York, N. Y., and New England Telephone & Telegraph Co., 195 Massachusetts Ave., Boston, plan the construction of a warehouse and supply depot at Mount Auburn and Grove Sts., here. Estimated cost to exceed $150,000.

Mass., Westfield — Finance Commission, City Hall, will soon award contract for the construction of a 3 story, 75 x 180 ft. boys trade school. Estimated cost $175,000. M. W. Maloney, 23 Pearl St., Springfield, Archt. Noted Apr. 3.

Mass., Wrentham—Dept. of Mental Diseases, awarded contract for the construction of a 2 story service building at State School. Estimated cost $40,000. Noted June 26.

Mich., Muskegon — Brunswick Radio Corp., Laketon St., plans the construction of a 1 story, 280 x 400 ft. factory. Estimated cost $300,000. Private plans.

Minn., Duluth—City, J. Wilson, Engr., will soon award contract for the construction of an 85 x 120 ft. airplane hangar to include machine shops, etc. at Williamson-Johnson municipal airport. Estimated cost $45,000. Sullivan & Oufalt, Archts.

Minn., Ely—Pickands-Mather Co., 700 Sellwood Bldg., Duluth, Minn., will soon receive bids for the construction of an engine house. Estimated cost $50,000. Private plans.

Mo., Kansas City—Kansas City Barrel Co., awarded contract for the construction of a 1 story, 110 x 200 ft. factory to J. Gier, 410 East 54th St. Estimated cost $100,000.

N. J., Fort Lee—G. Dexter, 201 Main St., Archt., will receive bids about Aug. 1 for the construction of a 1 story, 25 x 240 ft. machine shop and 20 x 200 ft. shipping building on Lemoine Ave. for Consolidated Film Industries Inc., Lemoine Ave. Estimated cost $75,000.

N. J., Harrison—Driver-Harris Co., Middlesex St., will receive bids about Aug. 1 for the construction of a 1 and 2 story addition to factory for the manufacture of wire products on Middlesex St. Estimated cost $250,000. J. A. Finegan, 770 Broad St., Newark, Archt. Noted June 26.

N. J., Hawthorne—J. C. Van Vlandren, 140 Market St., Paterson, Archt., will receive bids about Aug. 1 for a 2 story, 90 x 140 ft. garage at Nelson and Pasadena Aves., for S. Braen, 115 Totawa Ave., Paterson. Estimated cost $150,000.

Every one of these items is reported by our authorized correspondents who are instructed to verify every item sent in. This free weekly service is published in the interests of the buyer and the seller, to bring them together and get machinery moving.

Everything possible is done to insure authenticity and timeliness.

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BUSINESS NEWS DEPARTMENT
Tenth Ave. at 36th St., New York

N. J., Newark—J. Black, 246 Central Ave., will not construct auto radiator repair shop and garage at 268-274 Central Ave. $40,000. A. Wolf, 845 Broad St., Archt. Project abandoned.

N. J., Perth Amboy—General Cable Corp., 420 Lexington Ave., New York, N. Y., awarded contract additions to standard underground cable plant, two units here. Estimated cost $100,000. Noted June 12.

N. J., Plainfield—W. E. Lehman, 972 Broad St., Newark, Archt., is receiving bids for the construction of a 1 and 2 story, 100 x 135 ft. garage and shop here for Aetna Realty Co., 972 Broad St., Newark. Estimated cost $150,000.

N. Y., Brooklyn—C. Burnack, Meeker and Stewart Aves., is having sketches made for a 140 x 200 ft. service garage. Estimated cost $85,000. M. Klein, 65 Court St., Archt.

N. Y., Brooklyn—Dept. of Hospitals, is having sketches made for the construction of a 2 story, 75 x 110 ft. garage, etc., at Ocean Parkway and Ave. Z. Estimated cost $150,000. G. M. McCabe, 96 5th Ave., New York, Archt.

N. Y., Brooklyn—Federal Plumbing Supply Co., 1721 St. Marks Ave., is having sketches made for the construction of a 3 story, 46 x 117 ft. factory and storage building at St. Marks and East New York Aves. Estimated cost $40,000. E. M. Adelsohn, 26 Court St., Archt.

N. Y., Brooklyn—C. Ketron, 65 Court St., is having sketches made for the construction of an 82 x 102 ft. service garage at Roebling St. and Fillmore Pl. Estimated cost $40,000. M. Klein, 65 Court St., Archt.

N. Y., Brooklyn—C. Strang, 356 Coney Island Ave., is having sketches made for the construction of a service garage at Coney Island Ave. and Cator Pl. Estimated cost $50,000. E. M. Adelsohn, 26 Court St., Archt.

N. Y., Brooklyn—White Co., 407 Rockwell Ave., Cleveland, O., is having sketches made for the construction of a 110 x 189 ft. shop and storage building at Third Ave., Union and Sackett Sts., here. Estimated cost $100,000. A. F. Edwards, 230 Park Ave., New York, Archt.

N. Y., Buffalo — Ford Motor Co., 3674 Schaefer Rd., Dearborn, awarded contract for foundations and docks, piling fill, etc., for proposed 400 x 650 ft. factory at Hamburg Turnpike.

N. Y., Lockport—Simonds Saw & Steel Co., awarded contract for addition to steel manufacturing and rolling plant. Estimated cost to exceed $50,000.

N. Y., New York—Bd. of Education, 500 Park Ave., plans the construction of an industrial high school including shops, etc. at East 145th St. and Tinton Ave. Estimated cost $1,600,000. W. C. Martin, Flatbush Ext. and Concord St., Brooklyn, Archt.

N. Y., New York—Consolidated Gas Co. of New York, 4 Irving Pl., will receive bids about Aug. 1 for the construction of a repair shop at 71st and Exterior Sts. Estimated cost $350,000. J. F. Hunter, 4 Irving Pl., Archt.

N. Y., New York—Halpern Construction Co., 450 East Fordham Rd., will build a 2 story, 100 x 180 ft. service garage at 172nd St. and Jerome Ave. Estimated cost to exceed $70,000. G. W. Swiller, 4215 3rd Ave., Archt. Work will be done by separate contracts.

N. Y., New York—Twenty Five Rose St. Corp., S. Witkin, Pres., 11 West 42nd St., is having sketches made for the construction of a 2 story, 105 x 109 ft. service garage at 25 Rose St. Estimated cost $125,000. W. Shary, 22 East 17th St., Archt.

N. Y., Syracuse—Lincoln National Bank & Trust Co., South Salina and West Water Sts., plans remodeling Wieting Theatre block into garage. Estimated cost $1,000,000 to $2,000,000. M. L. King, Denison Bldg., Archt.

O., Cleveland—Cleveland Interurban R.R. Co., Terminal Tower, awarded contract for the construction of a 1 story, 57 x 142 ft. electric car repair shop at 6801 Sidaway Ave. Estimated cost $60,000.

O., Cleveland—W. S. Tyler Co., E. P. Disbro, V. Pres., 3613 Superior Ave., manufacturers of ornamental iron and bronze, had plans prepared for a 3 story, 70 x 100 ft. factory at East 36th St. and Superior Ave. Estimated cost $150,000. G. S. Rider Co., Marshall Bldg., Archt.

Ore., Portland—Pacific Greyhound Stage Lines, awarded contract for the construction of a 1 and 2 story, 200 x 240 ft. garage, stage terminal and offices at Sheridan and Hood Sts. Estimated cost $175,000.

Pa., Philadelphia — The Midvale Co., 4300 Wissahicken Ave., plans the construction of a 2 story, 50 x 100 ft. laboratory and office at Roberts Ave. and Blabon St. United Engineers & Constructors, 112 North Broad St., Engrs.

R. I., Providence—National Service Building Trust, 79 Milk St., Boston, Mass., awarded contract for the construction of a 1 and 2 story, 135 x 230 ft. service building on Promenade St. here. Estimated cost $160,000.

Tex., Harlingen—City, S. Botts, Mayor, plans an election July 8 to vote $200,000 bonds for the construction of an airport including shops, hangars, etc. Phelps & DeWees, Gunter Bldg., San Antonio, Archts. Beretta & Stiles Inc., National Bank of Commerce Bldg., Engrs. Noted June 26.

Ont., Brockville—Eugene I. Phillips Electrical Works Ltd. L. Grant, de Gaspe St., Montreal, Que., Pres. will soon receive bids for addition to plant, new machinery, etc. Estimated cost $750,000.

Ont., Toronto—Canada Foils Ltd, 35 Fraser Ave., plans a 1 story, 100 x 100 ft. factory. Estimated cost $50,000. F. S. Mallory, 11 Roseberry Ave., Archt.